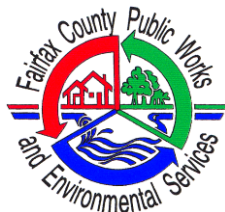




GUIDELINES FOR ARCHITECTS AND ENGINEERS

February 2015

County of Fairfax, Virginia
Department of Public Works
and Environmental Services



Developed and Issued by:
Building Design and Construction Division
12000 Government Center Parkway, Suite 449
Fairfax, Virginia 22035
(703) 324-5800 (phone) (703) 324-4365 (fax)

A copy of these guidelines may be obtained via:
http://www.fairfaxcounty.gov/dpwes/publications/guidelines/guide_toc.htm

GUIDELINES FOR ARCHITECTS AND ENGINEERS

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01000 - GENERAL DESIGN REQUIREMENTS

I. DESIGN

- A. Materials contained in the Fairfax County Guidelines for Architect and Engineers (Guidelines) are provided for information and guidance to preferred practices, and shall not to be construed as waiving or granting exceptions to any element of federal, state or local building codes, ordinances, and regulatory requirements as applicable to the specific project. Any conflict between these Guidelines and the governing local, state, or federal codes should be brought to the immediate attention of the Building Design & Construction Division (BDCD), Fairfax County Department of Public Works and Environmental Services (DPWES).
- B. The Architect/Engineer (A/E) is responsible to assure that the most current version of referenced design standards in the Guidelines is used for the project. The Owner does not guarantee that Exhibits and Appendices are the most current versions.
- C. The project plans and specifications shall reflect the information and requirements of these Guidelines as applicable to each project.
- D. All design and construction shall comply with the most current Americans with Disabilities Act Accessibility Guidelines (ADAAG) scoping and technical requirements, and Fairfax County accessible design concepts referenced within this document.
- E. The project plans and specifications shall reflect the information and requirements of these Guidelines as applicable to each project and shall provide the following information:
 - 1. Fairfax County project number, contract number, quality control signoff block, and bid authorization signature block on the cover sheet for all plan review submittal phases (see Exhibit 01000-A).
 - 2. Building address and key map.
 - 3. Site area (acres) and building square footage.
 - 4. Soil boring logs and locations.
 - 5. U-values for walls, roof/ceiling, door and window.
 - 6. Design roof and floor loads, soil bearing value and structural material strengths.
 - 7. Doors, windows, finish schedules; lighting fixture, equipment and signage schedules.
 - 8. Site plan drawings shall be at a common scale and be oriented the same direction on all sheets.
 - 9. Building Plans for all disciplines shall be at a common scale, and oriented the same direction on all sheets.
 - 10. The standard industry convention for referencing note and details shall be used on the construction documents.
- F. The A/E shall complete a Quality Control (QC) sign-off block on the cover sheet for plan

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submittals. The QC block shall include the number of QC hours spent by each discipline and be signed off by the responsible person reviewing each discipline. The QC block is to be included on the cover sheet for all submittals with the exception of the bid set and the permit set.

- G. The bid set documents shall be sealed, signed and dated (all plan sheets and the cover sheet of specifications) by an Architect or Engineer registered in the State of Virginia.

H. Drawing Standards

1. All civil, architectural, structural, electrical, mechanical, and plumbing floor plans (including reflected ceiling plans), as a minimum, shall be prepared using the most current version of AutoCAD to assure improved functionality when using a Building Information Modeling (BIM) program.
2. Use of BIM and Revit program is acceptable but not required at this time. When using BIM, the A/E shall coordinate with the County Project Manager for advance approval if a program other than Revit will be used.
3. Quality Control of plans shall include overlaying CAD floor plans to check for conflicts. AutoCAD layering convention shall conform to AIA and AutoDesk standards.
4. AutoCAD drawings shall be formatted as follows:
 - a. Zoomed to Extents
 - b. UCS set to World
 - c. Free of all extraneous lines or entities
 - d. Purged of all unused layers and blocks
 - e. Lines and polylines shall not be duplicated or contain unnecessary verticals
 - f. X-refs attached at 0,0,0
 - g. All entities placed on their correct/standard layer, with no entities on layer 0.
 - h. Units set to Architectural feet and inches.
 - i. All entities drawn with color and line type by layer
- I. Specifications shall follow CSI, 16-division format; and be specific regarding the codes to be met. Sections of specifications that are performance based must be clearly identified as such. Owner must approve use of performance specifications.
- J. Project specifications shall require that operations and maintenance (O+M) manuals include a complete paint schedule for the entire building; manufacturer and color information for plastic laminates, floor tiles, stains and varnishes, ceiling tiles, ceramic tiles; and all hardware model numbers. Brand names and specific information required for future ordering from manufacturer must be provided. These requirements are to be coordinated with County General Conditions and Division 01000 Specifications for O+M

manuals and as-built documents. The Contractor must be required to provide as-built information to meet these requirements.

- K. The A/E shall coordinate for allowances to be included in the specifications General Conditions, to include items and work scope required for unforeseen conditions. The allowance items, quantities and the associated costs are subject to Owner's verification and approval. The common allowances may include the following:

- Unsuitable soil undercut
- Rock excavation
- Additional signage
- Contaminated soil removal
- Partnering
- Aggregate material (VDOT 21A or 21B)
- Utilities
- Geotextile fabric
- Additional fire marshal requirements

The A/E shall coordinate with the County Project Manager for allowances required for each project.

- L. Requirements of these Guidelines must be coordinated with the County's Fire Station Design Manual, Police Station Design Manual and the Library Design Manual for applicable projects; and any conflicts brought to the attention of the County Project Manager for resolution.
- M. The A/E is responsible for submitting and tracking project plans through the County building and site plan review process (Department of Public Works and Environmental Services (DPWES) Land Development Services (LDS), in a timely and diligent manner, and for making all required corrections, inserts, re-submissions, etc. Designers shall follow the latest edition of the Engineers & Surveyors Institute (ESI) Site Plan Peer Review checklist in the preparation of site plans.
- N. The A/E must carefully review the County's Special Conditions Sections A thru E and Division 1- General Requirements Sections 01000-01700; and coordinate all design specifications with these County requirements. Any conflicts or proposed modifications impacting standard County specifications must be brought to the attention of the County Project Manager.
- O. All applicable requirements of the Fairfax County Special Inspections Program must be reflected in the project specifications. The structural engineer must comply with all requirements of the Special Inspections Program including stamping shop drawings as reviewed or approved, as required.
- P. For buildings that are classified as critical structures under the Fairfax County Special Inspections Program <http://www.fairfaxcounty.gov/dpwes/publications/simcontents.htm>,

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the owner will hire a testing agency to perform all critical structure required inspections in the building. The Contractor shall still be responsible for all required testing and inspections not falling under the County's Special Inspection Program. If the building is not classified as a critical structure, the Contractor shall have all required inspections performed in the building. The project specifications must reflect these inspection and testing requirements for the contractor.

- Q. The A/E shall coordinate with the Owner to determine if the facility is designated as an "Essential Facility", and incorporate requirements for such facilities into the project plans and specifications.
- R. In buildings with fixed shelving and stacks, such shelving and stack floor areas, must be deducted from the net square foot floor area calculations.
- S. Fairfax County Office Space Standards

The Fairfax County Office Space Standards shall be adhered to in the space program for allocation of space indicated in the table below. The "Style" categories "A", "B", and "C" represent private (drywall) offices. Categories "D" through "G" are systems furniture workstations. Square footage figures are intended for planning purposes. Actual sizes of offices or workstations may vary due to the building floor plate, column placement, or standard workstation component dimensions.

Space Category	Title	Square Footage
Group A	Director	240 SF
Group B	Director & Assistant Director	180 SF
Group C	Director, Assist. Director, & Branch Chief	120 SF
Group D	Professional Staff	100 SF
Group E	Professional & Technical Staff	64 SF
Group F	Technical & Clerical Staff	48 SF
Group G	Temporary & Shared Workstations	30 SF

Table 01000-1 Fairfax County Office Space Standards

- U. Practices for Commercial Trash and Recyclables Handling
 - 1. Refer to Fairfax County Public Facilities Manual (PFM) Section 10-0300 for Solid Waste and Recycling system requirements, and PFM Plate 33-10 for site layout requirements for a two dumpster trash and recycling containers area. Any variations from these requirements shall be coordinated with the County Project Manager and DPWES Division of Solid Waste Collection and Recycling.
 - 2. Collection containers described by Section 109-5-5(e) of the *Code of the County of Fairfax* shall not obstruct access to sanitary sewer manholes. A clear zone is required

- for a distance of 3 feet around the rim of any sanitary sewer manhole cover to provide access to the sanitary line in the event of an emergency and an area for erection of equipment for safe entry into the manhole.
3. The recycling collection system within the building shall include central collection containers for office paper in copier/printer rooms and other major generation areas.
 4. If recycling carts are emptied directly into a dumpster or compactor, the receiving equipment should be clearly marked to identify it as a recycling unit; "Recyclable Paper and Cardboard Only, No Trash".
 5. Recycling containers should be different and readily distinguished from those used for refuse.
 6. Trash and recycling rooms must be either:
 - a. Separated from the rest of the building by 2-hour fire rated construction or;
 - b. Protected by automatic sprinklers designed for Ordinary Group 2 Hazard in accordance with the currently adopted NFPA 13 Standard.
- V. Specifications shall require that the Contractor provide written, biweekly updates to the Owner/Architect detailing the status of all trade inspections including building, mechanical, electrical, plumbing, Fire Marshal, and Health Department, if applicable. Contractor's written updates shall specifically identify all items of work, which have been rejected or otherwise not approved by inspectors.
- W. All projects are to be designed and constructed under the principals of Sustainable/ Green Building design, primarily as defined by United States Green building Council (USGBC), LEED®, unless County Project Manager provides written direction that it is not the requirement for the project. Target level of LEED® certification is to be silver certification. The A/E shall reflect the DPWES Green Building Design Guidelines shown in Appendix A (pending) in the project design documents, and shall clearly identify all products included in the specifications that contain post-industrial recycled content materials, and all regionally manufactured materials as defined by USGBC LEED® criteria. Selection of products to meet these guidelines shall be coordinated with the Owner prior to final specifications.
- X. All site retaining walls, freestanding monumental site signs, and bus shelters must be identified on the building permit application; otherwise, a separate building permit is required. The A/E is responsible to obtain all permits. As applicable, the pre-approved bus shelter model and plan control number must be shown on plans. A state building permit is also required for all bus shelters with any part located within the VDOT right-of-way.
- Y. The A/E shall verify and obtain the most current version of the "Code Reference Package

for Architects, Engineers, Designers and Installers” from the Fire Prevention Division of The Fairfax County Fire and Rescue Department (FRD), and all requirements of the Code Reference Package shall be reflected in the plans and specifications. A copy is available from the Fire Prevention Division’s website at:

<http://www.fairfaxcounty.gov/fr/prevention/fmpublications/crp2009.pdf>

- Z. Provide storage space identified as “FMD Storage” sized to house attic stock for the building. Locate FMD storage space within or adjacent to the mechanical room.

AA. Accessible Design

The ADAAG requirements and most recent Fairfax County Smart Design Task Force Report and Recommendations for Universal Design (Appendix B- pending) are to be used. Additional items noted in this section are minimum design guidelines that the A/E is encouraged to meet to provide a greater accessibility for the facility. In addition, the A/E shall coordinate closely with DPWES to strategize and determine a plan for how to most effectively allocate the 20% ADA required funding commitment for renovation projects. The building’s design shall:

1. Provide for equal access and use by everyone.
2. Provide for the usability of the design features in more than one prescribed way.
3. Make it easy to understand the purpose of each design feature and how to use it.
4. Provide all essential information in a variety of modes.
5. Eliminate, isolate or shield any design feature that could prove hazardous or inconvenience any user.
6. Employ design features that require little or no physical force to use them.
7. Provide an adequate amount of space in all program areas that is appropriately arranged to enable anyone to use them.
8. Provide seating, such as benches, seat walls, etc., along path of travel for those who cannot stand or walk long distances without resting.
9. Provide for accessible counters and sinks in break rooms and kitchenettes, and locate them in a central or easily reached area of a room. All accessible sinks shall have functioning cabinet doors.
10. Provide for easy maneuvering and passage by mobility devices such as wheelchairs, when selecting furniture and furnishings in all spaces, especially conference and meeting rooms
11. Provide adjustable desks, chairs, and podiums for conference and training rooms as applicable.
12. Provide fully automatic (sensor operated) or push-button activated automatic door (s) at the main public entrance.

II. PRODUCTS

- A. The A/E shall coordinate with the County Project Manager to identify any products or manufacturers that may need to be specified to be proprietary, or limited to less than three

acceptable manufacturers as No Substitution/No Equal Products. Justification for No Substitution/No Equal Products must be provided in advance.

- B. Any specified material, equipment or system which will be a No Substitution/No Equal Product, must be approved in writing by DPWES, prior to advertisement for bids. The County Project Manager will obtain a letter from the “No Substitution/No Equal Products” vendor prior to advertisement of bids, stating the value of the subject work, and that the same pricing will be provided to all the contractors.
- C. The A/E is responsible for verifying that the manufacturer and product numbers for all materials and products included in the specifications are current at the time of bid. This shall include verification of all material and product designations included in these Guidelines.
- D. No Asbestos Containing Materials (ACM) are permitted to be specified, or otherwise approved, for use on any County project, unless the County specifically provides advance written approval.



PROJECT NAME

Project Location (address/locality)

Magisterial District: _____

Project number (including fund #)

Contract Number CN: _____

A sample elevation/3D picture as space permits

Project Submittal Phase and Current Date

Department of Public Works and Environmental Services

QC Block

(See Exhibit A, Page 2)

Show on SD, DD,
and CD Sets only

Do not show on
Final Bid Set

DPWES LOGO

Design Team

Name

Discipline

Address

Phone

Approval Block
(See Exhibit A, Page 2)

APPROVALS

RECOMMENDATION FOR APPROVAL OF CONSTRUCTION:

 Director – Building Design and Construction Division, DPWES Date

 Using Agency Director (show agency name) Date

APPROVED:

 Deputy Director – Date
 Department of Public Works and Environmental Services

QUALITY CONTROL SIGN-OFF

(for all submittals with the exception of Bid Set)

NAME	DISCIPLINE	HOURS
	Architectural	
	Civil	
	Structural	
	Mechanical/Plumbing	
	Electrical	

02000 - SITE WORK

I. DESIGN

A. All site design must conform to the requirements of the Fairfax County Public Facilities Manual (PFM), Fairfax County Zoning Ordinance (ZO), Americans with Disabilities Act Accessibility Guidelines (ADAAG), and other governing codes and ordinances. All references for site construction and site details shall be to the PFM and/or to Virginia Department of Transportation (VDOT) standards.

B. Drainage

1. All storm sewer systems shall be designed for the 10-year storm event. It is recommended that all storm sewer pipes shall have no less than 1% slope, and all designs shall conform to PFM requirements. If slopes less than 1% are required, these storm sewers need to be highlighted and noted for special construction attention.
2. Drainage systems shall be designed to convey water to a natural watercourse or to an existing storm drainage facility on or off site. Outfalls of drainage systems which discharge onto adjacent property shall be in easements from the property line to either an existing easement or to a natural watercourse with bed and banks, per the PFM.
3. Overland relief shall be provided so that buildings will not be flooded during major storms. Overland relief shall be evaluated using the 100-year storm event.
4. The drainage system, including overland relief, shall be designed to account for flows from both on site and off site areas.
5. Grate inlets are prohibited on County maintained facilities unless approved in writing by DPWES-Maintenance and Stormwater Management Division (MSMD).
6. No buildings or parts of buildings, including overhangs and footings, retaining walls, or other building structures shall be constructed or placed within, or encroached upon, County storm drainage, sanitary sewer, or utility easements, unless prior approval received. In some cases, utilities can be “sleeved” under a retaining wall to prevent future maintenance issues.
7. All storm drainage pipes shall be reinforced concrete pipe with a 15” diameter minimum, unless otherwise approved in writing by the County Project Manager and MSMD. For heavy traffic bearing surfaces or deep excavation applications, RCP is required to be used.

C. Grading

1. Buildings must be sited so that no flooding will occur even if there is a failure of the piped system.
2. The site must be graded such that if the piped system did not exist, there would be no flooding of any buildings. The site plan will be reviewed against the above standard and must conform to it.
3. The first floor elevation of the building shall be at least 18" above the 100-year water surface elevation of the flood routing.
4. The building shall be sited on a pad that slopes away from the building at a slope of 5% for a minimum of 10 feet, except for hardscape areas which should be sloped at 2%.
5. All paved and/or formed surfaces excluding equipment pads shall be designed to slope throughout their entire area for positive drainage unless otherwise noted. Sloped surfaces shall include all indoor and outdoor vehicle storage, maintenance, and parking facilities as well as pedestrian walking areas exposed to outdoor weather.
6. All intentionally level surfaces shall include provisions for drainage such as floor or trench drains.
7. Grading will be designed to provide convenient access to the storm sewer and sanitary sewer facilities for maintenance and use.
8. No plants or landscaping shall be placed where they will interfere with the drainage patterns or where they will block inlets or access. When planting trees 20 feet or closer to a building adhere to Public Facilities Manual Section 12 (vegetation, preservation and plating).
9. All grassed areas shall have a minimum slope of 2% unless otherwise approved in writing by the County Project Manager.

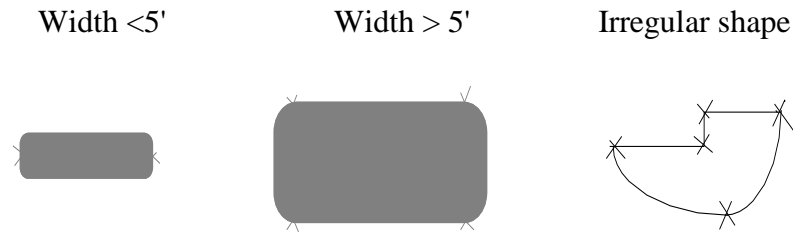
D. Stormwater Management

1. All Stormwater Management (SWM) and Best Management Pond (BMP) facilities shall be designed for 2-year and 10-year storm events and shall pass the 100-year storm event as required by the PFM.
2. Building Design and Construction Division (BD CD)/DPWES encourages the use of innovative stormwater detention and water quality provisions including the use of rain gardens, sand filters, bioretention ponds, vegetated dry ponds, porous pavement, and conservation easements, where applicable and subject to MSMD and LDS approval. Landscaped dry ponds are preferred, subject to approval of MSMD.

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3. Landscaping at all SWM and BMP must be coordinated with and approved by County Project Manager (PM to coordinate with MSMD and LDS).
4. Refer to the latest edition of the PFM for acceptable soil mix and planting materials in the bioretention facilities:
<http://www.fairfaxcounty.gov/dpwes/publications/pfm/chapter6.pdf>
5. Where feasible, use of curb and gutter at on-site roadways and parking areas should be minimized to encourage sheet flow to lawn areas and minimize concentration of stormwater to structures and pipe.
6. Refer to PFM for the design criteria relating to the maintenance of stormwater management facilities (detention and water quality), including the following:
 - a. Access ways to be cleared, graded, or constructed with the facility construction.
 - b. Proximity to a public right-of-way to minimize the length of the access way.
 - c. Multiple access ways for major facilities.
 - d. No plantings, fences, or other obstructions to access.
 - e. No plantings on the dam or berm of any stormwater management pond, without specific approval of the County Project Manager and MSMD.
 - f. No slopes greater than 3:1 along the edge of the access ways.
 - g. One all-weather roadway for access to major facilities.
 - h. A concrete trickle ditch is not recommended;
7. Underground stormwater detention and BMP chambers are specifically prohibited from use on County facilities. All exceptions shall be reviewed and coordinated with the County Project Manager and MSMD.
8. Spot elevations should be provided in sufficient numbers to indicate to the Contractor the clear intent of the design for site grading and top of curb elevations.

9. On parking lot islands, top of curb elevations shall be provided as shown below:



E. Accessibility

1. All site design shall comply with the requirements of the most current ADAAG. Any potential variance shall be brought to the attention of the County Project Manager before incorporation into the plans.
2. Accessible travel ways can not exceed a 2% cross slope, or a 5% running slope. Slopes in excess of 5% must be designed as ramps per ADAAG requirements.
3. Accessible path of travel shall be noted on the site plan from public street point of access and other site features to the main entrance.

F. Landscape Development

1. Designer Credentials

Any firm or individual charged with the preparation of landscape plans for new or existing public facilities must submit to the County Project Manager the name of the person or persons who will be responsible for the plan preparation.

2. Plant Recommendations on Fairfax County Properties

The selection of plant materials will, in general, be made from the approved list of plant materials included in the PFM. Plant materials appropriate for the particular site and location should be reviewed and selected to promote short and long term survival and not require irrigation. Common names of plants shall be included in the planting schedule for the site. Additional species may be used with approval of the County Project Manager.

<http://www.fairfaxcounty.gov/dpwes/publications/pfm/chapter12.pdf>.

3. Spacing

- a. Plants shall normally be spaced so that they will touch when they achieve 2/3 of their largest potential size. This rule varies according to specific design

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objectives, but over-planting to achieve a premature "finished" look is not acceptable; nor is expanded spacing that results in permanent, unplanted, mulched areas.

- b. No woody shrub is to be planted closer than three feet from a building wall. No tree, other than columnar evergreens should be within 15 feet from a building wall.
- c. Maintain 10 feet clear around siamese connections and four feet clear around fire hydrants.

4. General Suggestions

- a. Locate plants in areas that are compatible with their growth requirements, i.e., azaleas should be used in a semi-shaded, well-drained locations rather than in sunny, pavement surrounded areas.
 - b. Large mass planting beds or plants that will achieve a natural height or more than 3 feet shall not be used, except by roads, parking lots, etc. In general, such mass planting beds shall not be greater than 10 feet wide at any given continuous mulched bed. A/E shall consider CPTED principals and sight distance requirements in the site design.
 - c. Beds planted solely with low ground cover plants, such as vinca minor, heder helix, or pachysandra, are not acceptable, except on slopes too steep to mow. Such plants (except heder helix) shall be used in conjunction with woody shrubs. Woody ground covers such as horizontal junipers, cotoneaster, helleri holly, germander, or herbaceous materials such as liriop, sedum, etc. are acceptable, provided no planting of a single species exceeds 12 feet in bed width. Exceptions can be made depending on specific site conditions.
 - d. All plants specified must be hardy to U.S.D.A. Zone 6. Specifications for all plant materials shall include adherence to the latest Landscape Specifications for the Baltimore-Washington Metropolitan Area.
 - e. Specifications shall identify proper preparation of beds for trees, shrubs and ground cover in order to promote best chances for survival of plantings.
5. Locations for trees and shrubs must be coordinated with wet and dry utilities, utility easements and street/site lighting (including conduit), prior to submission to LDS.
6. Specifications shall provide that all trees, shrubs and lawns are to be have warranty and be maintained by the Contractor (watered, fertilized, pruned, weeded, etc.) to ensure survival and to support the warranty for a minimum of one year after installation and acceptance of the landscaping, but not less than one year from date of substantial

completion. Upon completion of the maintenance and warranty period, the Facilities Management Department (FMD), Building Design and Construction Division (BDCD) and the Contractor shall conduct a final walk-through of the site to ensure all plantings and lawn areas (grass) are acceptable. Minimum maintenance shall include weekly watering, as required, and spring and fall mulching.

7. The first approximately ten feet of lawn area nearest to the building on all sides shall be planted with sod. The requirement must be clearly reflected on the site plan, with an appropriate specification section included. Sod should be further extended as appropriate on a site-to-site basis to avoid narrow gaps of seeding.
8. All project specifications shall require full lawn maintenance during the one year warranty/ maintenance period from the date of substantial completion including watering, fertilizing, mulching, grass cutting, pruning, pest control, weeding of plant beds, edging, etc.
9. All new or disturbed drainage swales are to be sodded; or seeded, mulched and stabilized with biodegradable mat or fabric. Specifications for seeding and mulching must include straw mulch, to protect seed during germination period. Use of rip rap is acceptable if the stormwater volume and/or velocity may necessitate such material.

G. Fire Lanes and Signage

1. All fire lanes and locations of signs shall be marked on the site plan per applicable edition of the Fairfax County Fire Prevention Code and the FRD Code Reference Package. See <http://www.fairfaxcounty.gov/fr/prevention/fmpublications.htm#crp>. Contractor is to provide required signs, curb markings and pavement striping.

H. Screening

1. If barrier fencing is required, coordinate with Owner for acceptable fencing, that must also comply with Zoning Ordinance requirements. Black, vinyl coated chain link fencing is generally preferred at rear and side yards, where acceptable.
2. If block, masonry, stone or rubble screening or retaining walls are used, all wall elements must be securely anchored in place to prevent vandalism.
3. Screening walls and fence surfaces shall be treated with an anti-graffiti coating.

I. Pavement Design

1. All pavement sections for parking lots and roadways shall be designed based on CBR tests to be performed at appropriate locations during the initial geotechnical investigation. Specifications shall require the contractor to obtain additional CBR test results from soil samples at actual subgrade, and submit CBR results to engineer

for final pavement design. Design of the pavement section must accommodate the specific facility needs for types of traffic.

2. Any exterior architectural brick or stone pavers are to have a rough texture finish to minimize risk of slipping. Use of pavers is discouraged along the exterior, accessible path due to risk of displacement leading to ADA non-compliance.
3. Provide a concrete pavement extension at the dumpster pad for truck tires. Include bollards at rear and sides of dumpster location. Refer to PFM for design guides.

J. Site Lighting

1. Site lighting may be installed by Dominion Virginia Power or Northern Virginia Electric Cooperative (NOVEC) under the County's Municipal Street Lighting Contract; or by the General Contractor if County standard site lighting fixtures are used as approved by FMD for operation and maintenance. Coordinate with the County Project Manager. The site lighting design shall be prepared by the Architect as coordinated with the BDCD for County standards. After approval by the County and Dominion Virginia Power (or NOVEC or FMD), the site lighting is to be incorporated into the site plan by the Architect. The empty conduit for the underground cables is to be included in the construction contract in projects where light poles, fixtures and wiring are to be installed by Dominion Virginia Power or NOVEC. Architect is to prepare plats for easement locations based on approved site lighting layout, if required. All site lighting designs must comply with Zoning Ordinance Glare Standards and shall utilize sharp cut-off fixtures.
2. See Section 16000 for specifications on County standard lighting pole and fixture for small to medium size parking lots. Coordinate with the County Project Manager for possible use of LEDs.

K. General Requirements

1. The Architect is to notify adjacent property owners of submission of site plan per DPWES- LDS and Zoning Ordinance requirements.
2. Specifications shall require that the Contractor retain a testing agency to perform all site work testing and inspections more than 5' outside the building footprint. The Contractor shall not use the same inspection firm as the County retains for Special Inspections program.
3. The water meter must be properly sized to avoid unnecessary cost of purchasing an oversized meter. The plans must note that the Owner will pay for the water meter and gets a receipt, and the contractor is responsible for the pick up from the Water agency and the installation.

4. The minimum horizontal between water mains and appurtenances (including but not limited to service lines, meter boxes, valve boxes, and hydrants) and gas mains shall be 5 feet. When a water main or appurtenance crosses a gas main, either above or below, a minimum vertical clearance of 12 inches is required. When a concrete pad is required by the pipeline company, the water main shall be routed around the concrete pads, using 4-45° horizontal bends. The requirements shall further be coordinated and verified with the water authority and utility companies as applicable on a project by project basis.
5. The geotechnical report for projects located in problem soils must be submitted for the review and approval by DPWES Land Development Services (LDS) prior to completion of the Design Development phase.
6. All utility company easements, new and existing, must be shown on the site plan. The Architect shall prepare and submit to LDS stamped mylar originals for all on-site and off-site easement plats for review and approval by the end of the design development phase. All easement plats are to be prepared in the DPWES standard easement plat format, and all plats must be finalized and approved by Land Acquisition Division (LAD) by the 50% CD stage. It should be noted that easement plats are required for sanitary and storm sewer facilities located on Fairfax County owned properties that convey off-site flow, and that Fairfax Water (or the appropriate water agency) easements must be recorded before inspections will be made by Fairfax Water (or the appropriate water agency). Easements are also required for Dominion Virginia Power, Verizon, Cable and telecommunications lines, but not during site plan review. All easements must be coordinated with site improvements including landscaping.
7. Building corners are to be tied to property lines, using survey coordinates on the site plan (geometric layout plan).
8. Identify the service entry conduits for telephone, cable television (CATV), computer/data (I-NET), and electric into the appropriate room of the building. Provide two four-inch conduits each for all Verizon (telephone) and Cox (CATV and I-NET) from the main telephone room to the property line. Coordinate all new utility services and relocations, and identify all existing and proposed utility locations on the site plans, and coordinate with all landscaping.
9. Utility meters, transformers, generators, and service yards and the like are not to be located at the front of the facility, and must be screened from view, where appropriate.
10. Delivery doors must be heavy duty and provided with curb cut for materials delivery.

L. Sidewalks and Trails

1. A minimum of two (2) feet is required between the trail edge and any vertical obstructions such as trees, utility poles, signs, or other obstacles.
2. All vegetative material within a clearing envelope of at least 10 feet high by 10 feet wide shall be removed prior to trail construction.
3. The minimum allowable longitudinal slope for trail construction shall generally be no less than one percent (1%). Maximum longitudinal slopes shall meet ADA standards and shall not exceed 5%, or 8.33% if designed as a ramp with handrails. The allowable transverse (cross) slope is 2.0%.
4. If longitudinal slopes on concrete sidewalks are equal to or in excess of three percent (3%) and when the underlying soil has 34% or more passing the No. 200 sieve and has a PI of 13 or less, Fairfax County Standard UD-3 sidewalk under-drain shall be installed.
5. Side slopes adjacent to sidewalks and trails shall not exceed 2:1.
6. All storm pipes associated with sidewalks and trails shall be reinforced concrete pipe, except for UD-3 sidewalk under-drains, where required by PFM.
7. Generally, 20 feet shall be the minimum allowable turning radius on sidewalks and trails. However, the actual minimum allowable turning radius shall be computed by the design engineer based on expected use and site conditions.
8. Provide a paved surface from all emergency exits leading away from the building to a paved area of refuge.

M. Termite Control

1. The A/E shall provide recommendation whether the termite control may be necessary for each project.
2. If termite control is necessary, the specifications shall require that under the slab termite control be provided with a one-year warranty from the date of substantial completion.

N. Accessible Design

1. Provide easy and direct access to all facilities.
2. Provide proper accessible circulation in/around a bus shelter.

3. Provide continuous accessible path of travel from building entrance to immediately adjacent bus stops and streets crossings.
4. Consider line of sight issues, including signs and sign placement, in all pedestrian access to and from the building.
5. In buildings with multiple functions and where separate entrances are provided for each function, each function shall have an accessible route and entrance.
6. When providing alternate accessible entry points to a room or building, consider the proper signage directing people to the ramp or entry point.
7. Consider two or more exterior accessible evacuation routes for emergency egress away from building.
8. Carefully consider use of pavers for accessible routes in conjunction with DPWES. Pavers tend to settle and create a maintenance issue. If a textured surface is desired consider other materials such as stamped concrete.
9. Consider population to be served when determining amount of accessible parking spaces to be provided. (Example: Senior Centers).
10. Provide accessible parking spaces adjacent to, or as close as possible to the building.
11. Consider accessible seating at the site/parking lots for rest areas. Consider accessible picnic tables to double for lunchtime/break use. Be mindful of curbs surrounding the area (access from parking lot by wheelchairs).
12. Accessible routes through a parking lot must comply with ADA slope requirements. Parking lots may have up to 10% grades but the accessible routes are limited to 5% running slope, 2% cross slope and 8.33% slope if ramped with handrails.
13. Design curb ramps so that drainage and debris do not collect at bottom of ramp. Do not place obstructions (drainage grates/inlets, trash cans) in the travel path. Pay careful attention to passenger drop off areas.
14. Any crossing signals adjacent to a County facility should be reviewed and coordinated with VDOT for length of crossing time.
15. Replace older (non-compliant) curb ramps that provide direct access to County facilities, including those immediately adjacent in the VDOT right-of-way.
16. Sidewalks should be a minimum width of 5' from the accessible parking area to the entrance(s) of the building.

17. Consider raising any crosswalk elevation to meet the sidewalk elevation. (Creates a subtle speed bump for drivers).
18. All crosswalks should be perpendicular to the roadway.
19. Provide an accessible path and parking for each program area of buildings with multiple entrances for different programs.

03000 CONCRETE

I. DESIGN

- A. All structural calculations, drawings, and mix designs for cast-in-place, structural precast and architectural precast concrete shall be prepared under the supervision of a Professional Engineer (PE) licensed by the Commonwealth of Virginia. All drawings, calculations, and mix designs shall be sealed, signed and dated by a PE licensed in the Commonwealth of Virginia. Specifications shall require the Contractor to provide PE certification of shop drawings, calculations, and mix designs.
- B. Designer of cast-in-place and precast concrete elements shall comply with all requirements of the latest copy of the Fairfax County Special Inspections Manual (FC-SIM).
- C. Project specifications shall state that the Contractor is not authorized to proceed with manufacture or procurement of cast-in-place or precast elements until applicable shop drawings, mix designs and color samples are approved; and any required mock-ups are constructed and approved.
- D. Specifications shall reflect that the Contractor is responsible for scheduling and complying with all concrete inspections and associated reports. This includes inspections performed by the Owner-provided third party inspection agency for the Critical Structures inspection per the FC-SIM. Refer to and coordinate with Division 1, Section 01400 – Quality Control and Testing.
- E. All concrete work not included by the FC-SIM shall be performed by the Contractor's testing agency.
- F. Calcium chloride is not permitted in concrete used for reinforced concrete pipe or structures for drainage or drainage structures as per VDOT.
- G. Where concrete work abuts the building structure, plans will specify that the expansion joint will be caulked with a traffic grade caulking, if applicable.
- H. Architect and/or engineer shall determine locations of construction and expansion joints and note specific requirements and locations on plans.
- I. Mix design for sidewalks, curb and gutter, and other site work concrete shall meet VDOT mix design specifications.
- J. Large, exposed, accessible cast in place and pre-cast concrete surfaces such as, but not limited to, retaining walls and screening walls are to be treated with a graffiti resistant coating.

- K. Project specifications shall require that all structural precast or architectural precast elements be manufactured at a precast plant that is a certified member of the Prestressed Concrete Institute (PCI) and is operated under the supervision of a PE licensed by the Commonwealth of Virginia.
- L. For cast-in-place concrete structures and pavements exposed to freeze-thaw conditions, the project specifications shall identify requirements for Water/Cement Ratio and Entrained Air Content, and that on-site testing for Air Content will be conducted by Owner's Testing Agency.
- M. On renovation projects where a portion of the existing slab on grade is removed, the documents must show a detail with appropriate notes to identify the requirement to maintain the integrity of the under slab vapor barrier at areas where existing slab is removed and then replaced. Where extensive saw cutting is required, contiguous larger area, slab removal is recommended instead of piecemeal slab removal and replacement to simplify the retention of a continuous vapor barrier.
- N. Concrete thickness for floor slabs directly on grade shall not be less than 3 ½”.

II. SUSTAINABLE DESIGN

The use of fly ash, slag and recycled aggregate in the concrete mix design specifications is encouraged where the strength, durability and finish of the concrete will not be adversely impacted.

III. SHOP DRAWING

- A. Project specifications shall require the Contractor to provide shop drawings for all cast in place, structural precast and architectural precast concrete, and all mix designs and connection details which are sealed, signed and dated by a PE licensed in the Commonwealth of Virginia, as required by the FC-SIM. Any documents required to be sealed, signed and dated by a PE by the FC-SIM that are not identified as a requirement of the Contractor in the specifications shall be considered to be a requirement of the Architect and the Structural Engineering Consultant.

04000 - MASONRY

I. DESIGN

- A. Additions and alterations to existing structures shall be designed with matching mortar color, joint type, masonry color and texture, and masonry coursing pattern for all exposed masonry elements. Rake joints are not acceptable. Joints should be concave or grape vine to ensure weather resistant type of joint.
- B. Contractor is required to hire a testing lab to take and test mortar cubes; unless the masonry component falls under the Fairfax County Special Inspections Manual requirements (FC-SIM).
- C. All exterior brick shall be Grade SW.
- D. Mortar shall comply with ASTM C270, Specification for Mortar for Unit Masonry. The compressive strength shall be specified by mortar type applicable for the type and location of masonry as required. The specifications shall require the general contractor to hire a testing lab to take and test mortar cubes; unless the masonry component falls under the FC-SIM.
- E. Glass block shall not be used on exterior walls without written approval of DPWES.
- F. Specify bull nosed block corners, for exposed block at occupied interior locations.
- G. Stock mortar colors are preferred. Written approval by County Project Manager is required for any custom or specialty colors.
- H. Project specifications shall specifically require compliance with all applicable requirements of the FC-SIM, where applicable. Any requirements of the FC-SIM not specifically identified as a requirement of the Contractor shall be considered to be a requirement of the Architect and the Structural Engineering consultant.
- I. Project specifications shall state that Contractor is not authorized to proceed with manufacture or procurement of masonry elements or mortar until all related shop drawings, mix designs, and color samples are approved; and any required mock-ups are constructed and approved.

05000 - METALS

I. DESIGN

- A. All design and related calculations for structural elements and connections falling under this section shall be performed under the supervision of a Professional Engineer (PE), licensed in the Commonwealth of Virginia; and, all structural drawings and calculations shall be sealed, signed and dated by the PE.
- B. Structural steel designs and drawings shall conform to all requirements of the Fairfax County Special Inspections Manual (FC-SIM) and American Institute of Steel Construction (AISC).
- C. Project specifications shall specifically require the Contractor to comply with all requirements of the FC-SIM and AISC where applicable. Any requirements of the FC-SIM and AISC which are not specifically identified as a requirement of the Contractor shall be considered to be a requirement of the Architect and the Structural Engineering Consultant.
- D. All welders must be certified by American Welding Society (AWS). Contractor must submit copies of certifications for all welders before the welders will be permitted to work on the project.
- E. Contractor must touch up paint and/or primer after erection of steel or other metals. Specifications must be clear that primer is not considered a finish coat where finished metal is required.

06000 - WOOD AND PLASTICS

I. DESIGN

- A. Counter tops shall be either cabinet supported or front/side leg or panel supported. Unsupported spans in excess of 3'-6" are unacceptable. Larger spans to be supported with structural member or vertical support. All counter tops in wet and humid locations must have all undersides, edges and cutouts sealed with waterproof coating. Ensure that pipes, etc., do not interfere with recessed mountings. Counter supports and base cabinets must not preclude handicap accessibility requirements.
- B. Counter tops at wet areas such as public restrooms, kitchens, and other high use areas shall be made of homogeneous plastic material.
- C. All surfaces of solid wood used for finishes at interior spaces must be sealed to prevent damage due to fluctuations in humidity and temperature. Wood paneling must have built-in expansion strips. Particleboard counters are not to be specified at wet areas such as pools, shower rooms, locker rooms, etc.
- D. All millwork and cabinetry shall be specified to be custom grade, as a minimum, as defined by the Architectural Woodworking Institute (AWI).
- E. All millwork and cabinetry substrate shall meet ANSI Standards for Medium Density Fiberboard for interior use.
- F. All cabinetry and millwork hardware shall be specified to be quality grade and meet minimum Builders Hardware Manufacturers Association (BHMA) standards for each type. Verify with County Project Manager for instances where heavy duty hardware may be applicable and/or required.
- G. Shop drawings for wooden roof trusses must be submitted to DPWES Land Development Services (LDS) for review and approval; and, drawings and calculations must be sealed, signed and dated by a Virginia Registered PE.
- H. Accessible Design:
 - 1. Evaluate use of rounded corners and top edges (drip lines) for counters, cabinetry and protruding trim.
 - 2. Provide roll under counters in all kitchenette areas for access by wheelchairs to sinks and appliance use. Minimum clear width of the opening and the knee clearances must meet ADA Guidelines.
 - 3. A conveniently and centrally located portion of all public counters should be accessible from a standard seating position to the maximum extent possible.

II. PRODUCTS

- A. The preferred counter top material at public use rest rooms, kitchens, and other high use areas is a solid, homogeneous plastic such as Corian by DuPont, similar product by Fountainhead, or Approved Equal.

III. SHOP DRAWINGS

- A. Specifications shall reflect that the Contractor shall be responsible for paying DPWES review fees for wood truss shop drawings.

07000 - THERMAL AND MOISTURE PROTECTION

- I. DESIGN: All roof designs to comply with National Roofing Contractors Association (NRCA) guidelines.
 - A. A metal coping system is preferred over a stone or pre-cast coping system. The County Project Manager must specifically approve use of a stone or pre-cast coping.
 - B. Exterior soffit should be constructed of anodized aluminum panels; Hardie Board; Dura Rock; Cement Board; or metal lathe with plaster. Gypsum board (drywall) and Green Board are not acceptable at exterior soffits.
 - C. Asbestos containing materials are not to be specified for roofing, insulation, fire stopping, fireproofing or any other materials on the project.
 - D. Adequate attic stocks for each type of sealant used must be required in specifications.
 - E. Pitch pockets should be avoided to the extent possible and should not be used where pipe columns penetrate the roofing system. An alternate method such as typical vent flashing should be used at pipe columns. All pitch pockets shall be fabricated from stainless steel or cooper, be half-filled with non-shrink grout and a pourable sealer, and shall comply with National Roofing Contractors Association (NRCA) recommendations.
 - F. Roof drain design must be coordinated with roof ballast specifications to ensure that ballast does not clog the drains. Specify screens at roof drains, as required.
 - G. The use of internal gutter systems shall be avoided.
 - H. All roofs will be designed with a fall protection system as required by OSHA regulation governing Fall Protection.
 - I. Snow guards shall be shown at appropriate locations (at least over doors) on the roof plan for all sloped roofs and shall be mechanically fastened (no adhesives).
 - J. The County Project Manager must specifically approve use of skylights on the project. All skylights shall have a screen that complies with 29 code of Federal Regulations 1910.23(a)(4) which reads “*Every skylight floor opening and hole shall be guarded by a standard skylight screen or a fixed standard railing on all exposed sides*” or become constructed with material and manner that meets the OSHA requirements to withstand an accidental fall of person on the skylight.
 - K. All roof access hatchways shall be protected as required by 29 CFR 1910.23(a)(8) “*every floor hole into which persons can accidentally walk shall be guarded by either: (i) A standard railing (I) a standard railing with standard tabards on all exposed sides, or (ii) A floor hole cover of standard strength and construction.*”

- L. Plans and specifications shall include language requiring the contractor to completely seal all return air plenum, AND obtain independent third party certification that the return air plenum envelope is appropriately sealed. .
- M. Plans and specifications shall identify a continuous vapor barrier at the exterior envelope, including at either the roofline or at the ceiling line of the top floor. An interior and exterior vapor barrier should be specified and detailed for the entire building envelope. The thermal envelope must be completely sealed to the exterior including attic and plenum spaces, as appropriate.
- N. The design documents shall provide for a “hard” flashing detail (metal flashing or equivalent) at all joints, with adequate allowance for flashing height, between the roofing and vertical building elements, such as clerestories, walls etc.
- O. High reflectivity roofing should be provided on flat roofs and at sloped roofs where aesthetics are not adversely impacted. Intent is to minimize the heat island effect per Green Building protocol.
- P. Roofing systems shall carry a minimum 20 year warranty. Roofing installation shall carry a minimum of two year installation warranty.
- Q. Pavers shall be provided on flat roofs, for access and maintenance of roof top mechanical equipment to help minimize accidental or incidental membrane damage. Concrete pavers shall be used only as recommended by the manufacturer. Compatible "membrane pavers" are acceptable.
- R. The roofing details shall include umbrella or continuous flashing details with minimum height of 8” at all non-curb mounted equipment.
- S. It is recommended to avoid roof mounted equipment (HVAC) whenever possible.
- T. All roof top equipment to be set on curbs with a minimum height of 8”.
- U. Roof expansion joints to be provided per NRCA guidelines.
- V. All low slope roof designs to incorporate positive drainage to roof drains/roof scuppers via sloping the structural framing or roof deck, designing a tapered insulation system, or a combination of both.

II. PRODUCTS

- A. Built-Up Roofing system-
Johns Manville, Firestone, Garland or GAF built-up 3 or 4 ply systems or **Approved Equal (must be approved by FMD)** with a minimum 20 year warranty.

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- B. Modified Bitumen Roofing system
Johns Manville, Firestone, GAF, Siplast, Suprema, Garland or **Approved Equal (must be approved by FMD)** with a minimum 20-year warranty.
- C. Single Ply Roofing System/IRMA System
EPDM is preferred on flat roofs. Rubber membranes may be acceptable, on an as project basis. The minimum acceptable systems for rubber membranes, EPDM, is Goodyear, Firestone, and Carlisle 60 mil systems or Approved Equal, with a minimum 20 year warranty. PVC and CPE systems are not recommended. TPO Roofing will need approval from FMD thru the County Project Manager on project by project basis. Further, ballasted single ply systems are not recommended because of poor maintenance and performance history. Fully adhered single ply systems are preferred.
- D. Shingles-Architectural shingles with lifetime (if applicable) warranty preferred, a minimum 20-year warranty is required.
- E. Where Lightning Protection is installed, provide UL Certification letter as well as record drawings.

08000 - DOORS AND WINDOWS

I. DESIGN

- A. Specify a key cabinet. The cabinet should be designed to accommodate 50% more keys than the current project requirements. The specifications shall require the Contractor to sort, label, and tag all keys (as applicable); set up key cabinet with index; and review it with the Owner.
- B. The Architect shall coordinate keying schedule with the DPWES, Facilities Management Department (FMD) and the using agency. Using agency will sign off on an approved schedule. All changes will be coordinated with FMD.
- C. Provide adequately sized access doors or panels in all walls and ceilings to permit access to all mechanical, plumbing, electrical, or fire alarm equipment which may require maintenance or updating. A minimum access door dimension is 15"; a minimum access door size in ceilings is 24" x 24".
- D. Steel sash windows should not be used. All new or replacement windows shall utilize thermo-pane glass, with thermal break sash and low-E coating. All windows shall have proper flashing (or thru wall flashing, if applicable) and sill receptor if required.
- E. The A/E shall specify field quality control and testing for curtain wall systems. The testing must be conducted by a qualified independent testing and inspections agency and issue test report. The testing shall include air infiltration (ASTM E783), water penetration (ASTM E 1105), and water spray (AAMA 501.2) tests on two or more representative areas of curtain wall conditions to determine compliance of installed system with the specified requirements. Curtain wall shall be repaired or replaced where test results and inspections indicate that it does not comply with specified requirements. Additional testing and inspections at contractor's expense will be performed to determine compliance of replaced or additional work.
- F. All doors within a building, both interior doors and fire rated doors, shall have matching finishes.
- G. Office, meeting, training and data room doors that exceed 7 feet in height require FMD approval.
- H. If possible, industrial use areas (mechanical, shop, electrical, data centers, etc.,) shall have double access doors. A/E shall confirm that door opening allows for all equipment within the space to be taken out of the space for repairs and replacement.
- I. All roof access doors shall have a minimum of 6" height above finished roof or platform level.
- J. All coiling grilles shall be designed with governors. Additional structural support for coiling grilles and overhead doors shall be shown on the plans.

- K. Door numbers in the design documents shall match the final operational door numbers/room numbers so that signage, keying and move-in are made easier.
- L. In areas with drywall partition, all doors shall have floor mounted door stops.
- M. Operable windows are permitted only when approved in writing by DPWES and FMD for specific use type. Locking mechanisms with key must be provided for such windows. Screens must be provided for operable windows when approved.
- N. The maximum recommended clearance for the bottom of any vehicle security gate in county facilities is 6".
- O. Accessible Design
 - 1. Use automatic door openers on main entry door. Ensure barrier-free access to door opening mechanism. Doors may be push button or automatic sensor operated. Verify with the County Project Manager.
 - 2. Do not install door closers unless necessary. If necessary, provide delayed action door closers that open freely before the closing cycle begins. If delayed action door closers can not be used, be mindful of closers on heavy doors. The door closing speed and operating pressure must comply with ADAAG.
 - 3. If accessible corridor is less than 60" wide, provide recessed doors. Recess door design for space and approach must comply with ADAAG.
 - 4. Dead-end hallways should be designed with sufficient wheelchair turnaround space.
- P. Plans showing all door and hardware locations and a complete hardware schedule detailing all lock manufactures, functions, designs and finishes shall be provided at the start of construction to DPWES and FMD locksmith. A lock cylinder keying meeting with the building users, DPWES, general contractor, lock hardware supplier and the FMD locksmith shall be held at the start of construction. Upon completion of the building and acceptance by the Owner, Fairfax County's permanent Schlage security lock cylinders shall be installed by FMD.
- Q. Electronic Access Control System

The requirement for inclusion and scope of electronic access control system in each facility shall be evaluated with the Owner during design. The County's standard access control system for all facilities (except for Adult Detention Center and the Courthouse) is Northern Computers with Winpak PE software. Adult Detention Center and the Courthouse facilities use TAC America access control system *with INET 7 software* and will continue with this system for any future work. All other facilities must integrate with the County's use of Northern Computers with Winpak PE software. All access control system components must be supplied by the sole source manufacturer to ensure compatibility for networking integration with like systems in other buildings. In

order to interface with the County's main access control system, each facility must be provided with the following components:

1. Controllers:

The controllers are to be specified as Honeywell PRO-3200 Series Controllers. No other products are acceptable.

<http://www.security.honeywell.com/me/access/products/co/117787.html>

Each facility must be specified with one of the following:

- Pro32ENC1 Enclosure with 4amp 12VDC power supply.
- Pro32E1PS Power Supply
- Pro32IC Controller Board
- Pro32EN Ethernet Daughter Board
- Pro32R2 Two Reader Board (8 of these Boards can be put on one Controller Board to control up to 16 Doors).
- Pro32BAT1 Battery Back up
- Pro32DCC Daisy Change Cable.
- Pro3200 IC Controller and Ethernet installations manuals.

Each Pro-3200IC controller board can handle up to 32 doors. Quantity of kits must be adjusted based on the number of applicable doors in each project.

A complete ready for operation access control system including but not limited to electronic locks, card readers, reader boards, power supplies, and any other equipment required for the access control system shall be specified. Programming of the system to interface with County's central system will be provided by the Owner.

2. Card Reader Panels:

All access control card readers shall be by HID Corporation multiCLASS™ readers capable of reading the standard 26 bit prox card (HID), MiFare Smart cards, and the FRAC Smart Cards all at the same time. RPK40 is recommended or Approved Equal that is fully compatible with all cards noted above cards and card readers. Proprietary access control system equipment, components and software are not acceptable.

3. Access Cards will be provided by the Fairfax County FMD.

4. Hardware design for Doors with Electronic Access Control

- a. Builders locksets for electric access controlled doors- The preferred lockset shall be a mortise lock with a ¾ inch latch bolt throw, it may be of a standard type (non electric operation) and an electric strike may be used to open the door or it may be an electric operation mortise lock. All locksets used on fire doors shall be fire rated. The trim of the lock shall be a lever handle that returns to the door within ½ of an inch of the door face. All finishes shall be either US 626 or US 32.

- b. Non-acceptable builders locksets for electric access control doors- Cylindrical key in lever locksets shall not be used with electric strikes.
- c. Panic exit hardware devices for electric access controlled doors- The preferred panic exit hardware device shall be a rim mounted latch retraction panic hardware device or a mortise panic hardware device with electric operation. Standard rim mounted panic hardware devices may be used with jamb mounted electric strikes. Panic hardware devices shall be of the standard panic hardware device type or fire exit panic hardware device as required by the Fairfax County VA fire code. The operating trim of any panic hardware device shall be a lever handle that returns to within ½ inch of the door face. All finishes shall be either US 626 or US 32
- d. Non acceptable panic hardware devices for electric access controlled doors- Vertical rod panic hardware devices shall not be used with any electric access controlled door.
- e. Electrical specifications: Voltage of electric access control hardware- Voltage of all electric access control hardware shall be determined by the requirements of the controlled access system. Consult the County Project Manager and FMD for details.
- f. Electrical specifications: Fail secure or fail safe function for electric access hardware- The function of all electric access control hardware shall be as required by the Fairfax County fire code.

II. PRODUCTS

- A. All locksets and hardware shall be compatible with 6 pin tumbler Large Format Interchangeable Core (LFIC) lock cylinders to accommodate Owner's permanent Schlage cylinders. Owner's permanent cylinders for door hardware shall be Schlage cylinders to be purchased by the contractor, and installed by the Owner (FMD). Architect shall note in the Hardware Schedule "Schlage 6 pin Large Format cylinder to be installed by Owner but purchased by contractor" for **each** hardware set (group). Refer to Section III for additional coordination requirements for locksets and hardware.
- B. Construction cores shall be provided by the Contractor on an as needed basis to secure the building. Construction master keys and cylinder core removal keys (control keys) shall be provided to DPWES immediately after installation. Upon completion of the building FMD shall remove all construction cores and FMD shall install owner's permanent lock cylinder cores purchased by contractor. FMD shall retain all construction cores and keys.
- C. All finish hardware with exception of electronic access control doors, exterior accessed mechanical and electrical rooms shall be selected from one of the following manufacturers' list of cylindrical locksets with 6 pin lock cylinders.

1. Schlage ND-Series US 32D or 626 Finish Rhodes Design Lever

2. Corbin CL-3300 Series US32D or 626 Finish NZD Design Lever**
3. Sargent 10 Line Series US 32D or 626 Finish LL Trim, L Rose, L Lever**
4. Schlage, Corbin**, or Sargent** (No Equal Products or Substitutions)

** A/E must confirm with manufacturer that lockset accepts and is compatible with the County's standard cylinder (Schlage 6 pin Large Format). If necessary, the contractor's hardware supplier shall get the cylinder body from Schlage directly for installation into their lockset.

D. All finish hardware used on doors for securing exterior accessed mechanical and electrical rooms shall be selected from the following manufactures' list of mortise locksets.

1. Schlage L-Series US 32D or 626 Finish Orbit Knob Trim, Hotel function
2. Corbin ML 2200 Series US 32D or 626 Finish GRC knob design, Hotel function**
3. Sargent 7800 Series US 32D or 626 Finish OB Knob Trim, Hotel function**
4. Schlage, Corbin**, or Sargent ** (No Equal Products or Substitutions)
5. Hotel function is specified as it provides a self-locking storeroom function lockset and a separate deadbolt to provide extra security to exterior accessed mechanical and electric rooms. These mortise locks shall be provided with removable core lock cylinders as section A of this specification indicates.

**A/E must confirm with manufacturer that lockset accepts and is compatible with the County's standard cylinder (Schlage 6 pin Large Format). If necessary, the contractor's hardware supplier shall get the cylinder body from Schlage directly for installation into their lockset.

E. All hardware for electronic access doors shall be selected from one of the following manufactures list of mortise locksets. These locksets shall be furnished with 6 pin tumbler Large Format Interchangeable Core Cylinders (LFIC) for manual key bypass in the event of fire or emergency.

a. Electric mortise locks

1. Schlage L series electrified mortise locks. 06 or ND Rhodes lever design trim
2. Corbin ML20900ECL series electric operation, mortise locksets. Newport NSA/NSB/NSF lever design trim**.
3. Sergeant 8200 series electromechanical series mortise locksets. L lever design trim**.
4. Schlage, Corbin**, or Sargent** (No Equal Products or Substitutions)

**A/E must confirm with manufacturer that lockset accepts and is compatible with the County's standard cylinder (Schlage 6 pin Large Format). If necessary, the contractor's hardware supplier shall get the cylinder body from Schlage directly for installation into their lockset.

b. Non electrical mortise locks to be used with electric strikes

1. Schlage L series mortise locks. 06 or ND Rhodes lever design trim.
2. Corbin ML 2000 series mortise locksets. Newport NSA/NSB/NSF lever design trim.**
3. Sargent 8200 series mortise locks. L lever design trim.**
4. Schlage, Corbin**, or Sargent** (No Equal Products or Substitutions)

**A/E must confirm with manufacturer that lockset accepts and is compatible with the County's standard cylinder (Schlage 6 pin Large Format). If necessary, the contractor's hardware supplier shall get the cylinder body from Schlage directly for installation into their lockset.

c. Electric strikes to be used with non electrical mortise locks

1. Folger Adam 310-2 ¾ series electric strikes
2. Von Duprin 6211 (HM frame) or 6213 (HM, Alum, or Wd retrofit) series electric strikes
3. Hes 4500 series electric strikes

- F. All hardware for panic exit devices for electronic access doors shall be selected from one of the following manufactures list of electric operation panic exit hardware. This hardware shall be furnished with 6 pin tumbler Large format interchangeable core cylinders for manual key bypass in the event of fire or emergency.

a. Electric operation panic or fire exit device hardware

1. Corbin ED5200 Series electric rim device
 ED 5600 series electric mortise device w/ Newport design lever trim
2. Sargent 8800 series electric rim device
 8900 series electric mortise device with L design lever trim
3. Von Duprin 99EL series electric rim device
 99E electric mortise E7500 device with 06 lever design trim
4. Schlage (Von Duprin), Corbin, or Sargent (No Equal Products or Substitutions)

b. Electric strikes to be used with non electric operation rim latch panic hardware

1. Folger Adams 310-4 series electric strikes
2. Hes 9500 series electric strikes (fire rated doors)
3. Hes 9600 series electric strikes (non fire rated doors)

- G. Where handicap accessibility is not required, surface mounted door closers should be Norton #1603 or #1604 or Approved Equal. Handicap accessible closers should be LCN 1461 or Approved Equal.
- H. Floor type door closers should be Rixson #27 or #28, or Approved Equal. Where handicapped access is required, use Rixson PH27 or PH28, or Approved Equal.
- I. Coordinate panic hardware with ADA requirements to ensure that a minimum of 32" clearance for door opening width, exclusive of hardware, is maintained.
- J. Hydraulic actuators should not be used for accessible door openers.
- K. Hinges at all doors should be ball bearing type.
- L. Fairfax County Fire Prevention Code requires the installation of an approved emergency building entrance system (key box or Knox box) for all buildings with the exception of single-family dwellings. See Fairfax County Fire Prevention Code at <http://www.fairfaxcounty.gov/fr/prevention/fmpublications/crp2009.pdf>
- M. Electric Strikes shall meet Underwriters Laboratories burglary resistance specification UL 1034. The preferred electric strike shall be Folger Adam Series 310. All electric strikes shall be US 626 or US 32D finish. Electric strike voltages and functions shall be compatible with access control system requirements.

- N. For partial renovations, all door hardware shall be specified to match the existing hardware in finish, style and keyway in order to maintain continuity. A propriety or ole source procurement approval must be prepared and identified in the specifications as required.
- O. Door Hardware Functions: The door hardware is to be specified with the following functions. Coordinate with County Project Manger for additional variations:

Door Type	Hardware Function
1. Standard Offices	Push button office or entry function – Allows quick simple locking with no key required.
2. Doors without locking function	Passage lockset- No locking needed just latching.
3. Restroom - Single Fixture Use i.e. family toilet room, unisex toilet rooms)	Bathroom function- Allows privacy but can be opened with any key in emergency.
4. Meeting Rooms, Classrooms in Offices, Group Rooms, Large Suite Public Areas	Classroom lockset- Can only be locked with a key.
5. Storage Room/Mechanical Or Electrical Rooms	Storeroom lockset -Stays locked can only be opened with a key.
6. Public Restrooms- Multi-fixture Use	School house safety deadbolt lock -Can be locked by key only from exterior. Person locked in can release deadbolt but can not lock themselves in, used to lock off bathrooms in case of plumbing problem.
7. Roof Access	Double Sided Storeroom lock- Stays locked on both sides.
8. School Classroom , Child Day Care Centers	Classroom intruder lockset- Always free to exit, locks only by key from inside the classroom, door does not need to be opened to lock from outside as a regular classroom lock.

9. Exterior accessed mechanical and electrical rooms

Hotel function- provides a self-locking storeroom function lockset and a separate deadbolt to provide extra security

Note:

These functions are for standard finish hardware. Electric hardware on electronic access doors stays locked at all times and opens only with a card access or keypad. The key is only to open the door in an emergency like a storeroom lock. Electric locks can be left "open" at all times but are either powered up and unlocked (fail secure is locked with power off) or they are fail safe and not powered (fail safe is unlocked with no power going to the lock).

III. LOCKSETS AND HARDWARE

All locksets and hardware shall be compatible with Schlage full size/large format interchangeable core lock cylinders to accommodate Owner's permanent Schlage cylinders. Owner's permanent Schlage cylinders will be purchased by the Contractor. Permanent full size/large format interchangeable core cylinders in Schlage Classic C, CE, E, EF or F shall be provided by the contractor. Functioning keys and control keys (keys to remove core from lock) shall be provided to Building Security Services/Lockshop immediately after installation. Projects larger than 25 cylinders will require that the contractors order cylinders through Building Security Services/Lockshop at the expense of the contractor, so that the factory can key the new cylinders to the new master key system prior to final installation and turnover of the space to Owner. All perimeter doors and all mechanical doors will be provided with Schlage full size/large format interchangeable cores in Schlage FG keyway.

09000 - FINISHES

I. DESIGN

A. Lath & Plaster

At a minimum, the industry standard for expansion joints shall be required by the design documents.

B. Gypsum Board

1. The application and finishing of Gypsum board shall conform to ASTM C840 - 11 Standard Specification for Application and Finishing of Gypsum Board.
2. A UL number must be specified for all gypsum fire-rated assemblies.
3. Access panels must be provided in gypsum board ceilings for maintenance access. See previous section 07000 for roof access door sizing. Panels must be provided for all maintained elements. If provision of the access panels compromises the aesthetics of the ceiling, either relocate the maintained elements to an accessible ceiling or change the design of the ceiling.
4. Water-resistant gypsum board must be specified for wall and ceiling use in toilet rooms and locker room areas. Durock or equal product must be used in shower areas and wet walls in toilets and lavatories.
5. The finish levels shall follow the requirements of ASTM C840 and Gypsum Association. The following finish level schedule shall be included in the documents and shall be coordinated with paint types for each area of the building:
 - a. Level 1: Above finished ceiling concealed from view.
 - b. Level 2: Utility areas and areas behind cabinetry.
 - c. Level 3: Areas that will receive heavy grade wall covering.
 - d. Level 4: Walls and ceilings scheduled to receive flat or eggshell paint finish
 - e. Level 5: Walls and ceilings scheduled to receive semi-gloss or gloss paint finish.

C. Ceramic Tile

1. The floor and the full height of wet walls in toilet and shower rooms (toilet and urinal areas may be at the toilet partition height) shall be ceramic tile. The preferred method for floor tiles is the full mud-set tiles, and thin set mortar for setting wall tiles. Walls not receiving ceramic tile shall have a ceramic tile base of a minimum 6" above finished floor. All grout to be sealed.

- a. Attic Stock- Specify a minimum of 50 SF or 10% whichever is greater, of attic stock of each type and of each color of ceramic tile used. Except for borders and accents where 5% of each type is required.

D. Wall Surfaces

All wall finishes at kitchens and food preparation or serving areas are required by the Health Department to be completely smooth and cleanable. No surface texture is permitted at these locations. CMU walls with block filler and paint/epoxy finish systems have been deemed unacceptable due to the reflection of the block texture through the finish system.

II. PRODUCTS

A. Acoustical Ceiling Tile

1. Use of any ceiling system other than a 2 x 4 or 2 x 2 lay-in should be brought to the attention of the County Project Manager and will be coordinated with the Facilities Management Department (FMD).
2. Access to maintained elements above the ceiling must be provided in any ceiling system used. Use of a ceiling system that does not provide access for maintenance will not be permitted.
3. Recycled content ceiling tile should be specified. Use Humigard or other microbial prevention treated tiles as applicable.
4. The acoustic ceiling tiles must be as follows:
 - a. Armstrong 756 for 2' x 2' or Approved Equal
 - b. Armstrong 755 for 2' x 4' or Approved Equal
 - c. Armstrong 896 for 2' x 2' or Approved Equal
 - d. Armstrong 895 for 2' x 4' or Approved Equal
 - e. UL rated fire guard
5. The use of concealed spline ceiling system is discouraged. The A/E shall coordinate with the County Project Manager for advance approval if the system is proposed for use in selected areas.
6. Attic Stock- Provide the following:
 - a. Provide two unopened cartons of each type of ceiling tile

B. Paints

1. All interior paints and primers shall be low VOC products. All surfaces shall receive a minimum of two coats of paint, in addition to an appropriate primer coat. Each coat must be allowed to dry completely before application of the next coat. Specify at least three color choices for the walls. Painting of interior surfaces shall be of the following paint types:
 - a. Walls (Level 4 or 5, see finish level schedule in I.B.5) - Eggshell latex (Semi-gloss in high traffic areas and other appropriate spaces as coordinated with the Owner)
 - b. Ceilings and bulkheads (Level 4 or 5)- flat latex
 - c. Doors and frames (metal/wood) - semi-gloss latex (Alkali for exterior)
2. Attic Stock- Provide the following:
 - a. One gallons of each color and type of paint used, with paint information legibly noted on each unopened container.
3. Acceptable manufacturers are:
 - a. Duron
 - b. Sherwin Williams
 - c. Benjamin Moore
 - d. No Equal Products or Substitutions

C. Resilient Flooring

1. The desired resilient flooring is 12" x 12" (300mm x 300mm) Vinyl Composition Tile (VCT). Specifications shall include three color choices for tile, base and treads. Other elements shall be coordinated with the VCT color(s).
2. All telecommunication and audio/video rooms shall use anti-static VCT flooring.
3. Attic Stock- Provide the following:
 - a. VCT - 1 unopened carton of each color and type.
 - b. Rubber base - 1 unopened carton of each type and color.
 - c. Rubber accessories - 50 linear feet (15 meters)
 - d. Rubber stair treads - 10 each of each color or type.

D. Carpet

1. Square carpet tiles shall be used. Specify a choice of at least three colors and/or patterns of carpet.

2. If broadloom or sheet stock is to be specified, prior approval must be obtained from the County Project Manager, who will coordinate with the FMD.
3. Low VOC, recycled content carpet shall be specified.
4. Carpet installation shall be by installer approved by the carpet manufacturer.
5. Attic Stock- Provide the following:
 - a. Specifications shall require provision of attic stock in unopened cartons and matching dye lot, equal to 5% of the carpeted area of the project for each carpet type. In addition, all usable scraps larger than two square feet, or more than 8 inches (200 mm) in width, shall be turned over to the Owner.
6. The carpet tiles and broadloom carpet must be specified from the mid range product lines of the following three manufacturers:
 - a. Milliken Modular Carpet Tile
 - b. Interface Carpet Tile
 - c. Shaw Contract Group
 - d. Specifications must note that No Equal Products or Substitutions for carpet tiles will be allowed.
7. Carpet must be a minimum of 28 oz weight.

E. Special Flooring

1. Prior approval of special floorings is required and the use of any such flooring shall be brought to the attention of the County Project Manager. Examples of special flooring are hardwood, rubber, concrete, laminate, terrazzo, epoxy or resin floors. Prior approval must be obtained from the County Project Manager for use of wood floors and for design of the support system for the wood floors.
2. Use of cork, linoleum or bamboo flooring, or other rapidly renewable products is encouraged for consideration, at appropriate locations and as coordinated with the County Project Manager.

F. Use of recycled content floor tile is encouraged at appropriate locations.

G. Floor surfaces shall be non-slip and non-glare.

10000 - SPECIALTIES

I. DESIGN

- A. Counter top supports shall be designed so as to conform to requirements of the ADAAG. Counter tops shall be either cabinet supported or have front leg and side panel supports. Unsupported spans in excess of 3'6" are unacceptable. Larger spans shall be supported with structural members or vertical support. Counter tops shall have all undersides, edges and cut outs sealed with waterproof coating. Ensure that pipes, etc., do not interfere with recessed mountings.
- B. Fire extinguishers shall be hung or cabinet mounted with a maximum permissible mounting height to top of extinguisher of 48". The charging date tagged on all fire extinguishers shall be the date of substantial completion. Fire extinguishers must be provided at elevator machine rooms, fuel sites, and mechanical equipment rooms. Provide recessed fire extinguisher mounting as required to meet ADAAG access and projection requirements.
- C. Flagpoles shall be designed for ease of maintenance, and for simple rope and halyard replacement. Flagpoles shall be anodized aluminum or aluminum and have internal halyard. County facilities that will require 3 flagpoles are courts, fire stations, police stations, and government centers. All other County facilities are required to have one flag pole. Flagpole design must conform to U.S. Flag Standards. All flags shall be lighted and lighting shall comply with the zoning ordinance glare and lighting standards. Use of energy efficient lighting is encouraged.
- D. Toilet Rooms
 - 1. Toilet partitions must have both floor-to-ceiling and wall bracing. Urinal screen shall have floor to ceiling pilaster support. Toilet partitions, doors, pilasters and screens shall be constructed of solid Phenolic or similar homogeneous plastic material. Recycled content material is preferred. Overhead bracing is acceptable when partitions are floor mounted. Panels shall be a minimum of 1/2" thick. All partition finish, including decorative, shall be an integral part of the core material. Doors and Pilasters shall be a minimum of 3/4" thickness and all finish including decorative, shall be an integral part of the core material.
 - 2. Design must avoid line of sight from entry door to urinals and to mirror reflections.
 - 3. Wall backing at wet walls of all rest rooms shall be water-resistant plywood, water-resistant gypsum board such as Durock (or equal).
 - 4. All staff toilet rooms shall be provided with automatic hand dryers. Installation of hand dryers must meet ADAAG requirements for access and projection clearances.

5. All public toilet rooms shall be provided with automatic hand dryers. Installation of hand dryers must meet ADAAG requirements for access and projection clearances.
6. All public restrooms shall be provided with baby changing stations. Use of family restrooms shall be considered at lobby of very large, public facilities and as required by code. Installation of changing table must meet ADAAG requirements.
7. At public toilet rooms, specify automatic, infrared sensors for use in automatically activating water flow valves at lavatories. All other fixtures are to be manually operated. Low flow, ultra-low flow, or dual flush water saving fixtures are to be specified for use at all plumbing fixtures.
8. All sink counters to be solid surface material.

E. Janitor's Closet

1. Janitors' closets used for storage of any quantity of highly combustible material must have an automatic sprinkler system.
2. Provide one closet per 25,000 square feet gross floor area, at a minimum of one closet per floor (or increase size of closets proportionally). The size shown is a minimum size. Janitor's closet must be vented independently.
3. Standard janitor's closet requirements:
 - a. Walls to be water-resistant gypsum board, such as Durock, Hardy Board, or equal, covered with sanitary type vinyl to 48" Above Finish Floor (AFF). Walls to receive coating of Sanitile 550 or equal above the vinyl. Ceiling to receive enamel painted wall board.
 - b. Floor shall be slip resistant, sealed concrete.
 - c. Provide 24" mop rack with 3 mop holders.
 - d. Provide two double coat hooks.
 - e. A 110-volt outlet must be provided at all janitors' closets.
 - f. Provide 3'-0" x 6' 8" door (minimum size).
 - g. Provide five wall-mounted shelves, 12" deep x 48" long, 12" on center vertically. First shelf to be 18" AFF.
 - h. Provide heavy duty vinyl or stainless steel corner guards at appropriate locations including the door and door frame.

- i. Mop sink to be constructed of monolithic, preformed basin material with stainless steel sill.
- j. Include hose and reel as part of mop sink.
- k. Faucet shall be type a/b/e specialty mop sink with pail hook and wall brace, or equal.
- l. All plumbing connections shall be ½ mnps threads.
- m. Light fixture shall be Stonco vapor tight fixture with grill, or equal.

F. Interior Signage and Labeling

- 1. Signage to comply with requirements of ADAAG as to character, proportion, height, finish, mounting location and Braille content where required.
- 2. Exact signage requirements will be specified during the design phase.
- 3. Each room in the facility shall be labeled or numbered to facilitate maintenance and emergency response.
- 4. Room names in the design documents shall match the final operational room names to ease the coordination of signage preparation and move-in. Room numbers on final plans shall also be the same as room numbers on signs for alarm and security use in the facility operation.
- 5. Rooms which are identified (labeled) as to use do not need to be numbered, unless there are more than one of each such rooms in a facility. Examples:

"Men"	"Women"
"Janitor"	"Telephone Equipment"
"Electrical Equipment"	"Mechanical Equipment",
"Stair", etc.	

- 6. Rooms that are not signed shall have numbers provided on the upper corner of each door or door jamb of main door to each room. Numbers shall be small 3/4" and applied so as to be of use only to County maintenance personnel; or, if the numbering system is to be referenced on the Building Directory, utilize larger more visible numbers.
- 7. Rooms shall be numbered from left to right beginning at the suite entrance door, as practical.
- 8. All workstations shall be numbered independent of room numbers.

9. Any room containing equipment related to the fire alarm system, must have signage meeting the Fire Marshal's requirements in terms of lettering size (1 ½") and contrasting colors. Typical rooms may include but are not limited to Main Electric Room, Fire Control Room, Fire Pump Room, Sprinkler Riser Room and Sprinkler Control Room.
 10. All mechanical or electrical equipment located above a suspended ceiling shall be labeled/ identified at the suspended ceiling. Fire alarm devices located above a suspended ceiling must have a nameplate identifying the device at the appropriate suspended ceiling location and also at the point of access to the device if different from the suspended ceiling. Nameplates for fire alarm devices shall be ½" minimum height white letters engraved on a minimum 1" wide red plastic laminate plate.
 11. The street address number must be provided, clearly visible on the front of the building.
 12. For emergency response purposes, all exterior doors in public safety facilities shall be clearly labeled with an identifying door number at the interior and exterior and with door numbers visible from an aerial position. For all other facilities, the A/E shall coordinate with the County Project Manager at the early design phase to determine signage requirements.
- G. Automated External Defibrillators (AEDs) will be installed in all County worksites as part of the County's Public Access to Defibrillation (PAD) program. The Risk Management Division manages the PAD program and is responsible for installation of AEDs in accordance with County and ADAAG standards. Appropriate space in the public area of the building must be provisioned and coordinated with Risk Management staff.
- H. Space for recycled material collection/storage must be provided and designated, preferably near the loading dock or dumpster area.
- I. Accessible Design:
1. Evaluate use of Family Restrooms, if applicable to specific building. Include baby changing tables at public area restrooms.
 2. Soap dispensers in toilet rooms, shall be provided to the side of the wash bowl in the counter instead of along the rear wall. If automatic soap dispensers are specified, they shall be sensor operated with hardwiring (no batteries permitted).
 3. Clearance at paper towel dispensers, trash receptacles and lavatories shall not overlap with common circulation and meet ADAAG standards.
 4. Locate hooks no taller than 48" on the back of toilet stall doors, if applicable.

5. Wall mounted objects such as hand dryers, baby changing stations another dispensers, within the toilet rooms, shall met the requirements of ADAAG for protrusion into the accessible path.
6. No shelving shall be provided in restrooms. Where exceptions are requested such as in Libraries, A/E shall ensure compliance with ADA requirements.
7. Accessible drinking fountains shall be provided in an alcove or with wing walls in compliance with ADAAG requirements for protruding objects.
8. Evaluate use of front-loading washer and dryers, where applicable.
9. Evaluate the installation of at least one assistive listening system in each building in an area of assembly such as, classrooms, meeting areas, conference rooms, or theaters.
10. Card access system for entry, must provide for sufficient time for opening of the door for a person to pass.
11. Lettering size for informational signage shall be as large as practical in consideration of those with low vision.
12. Accessible routes and equipment accessibility shall be considered when locating and purchasing vending machines, copiers, kiosks, and other specialized equipment.

II. PRODUCTS

- A. The preferred toilet accessories are as follows. Notify the County Project Manager for alternate model if those listed are discontinued:

- | | |
|--|--|
| 1. Toilet tissue dispenser | Bobrick B-274 |
| 2. Toilet Tissue Dispenser and Utility Shelf | Bobrick B-2840 |
| 3. Towel dispenser- recessed | Bobrick B-369 |
| 4. Sanitary Napkin dispenser | Bobrick B-4706 50 |
| 5. Napkin Disposal | Bobrick B-270 |
| 6. Toilet Seat Cover Dispenser | Bobrick B-221 |
| 7. Waste Receptacles (recessed only) | Bobrick B-3644 |
| 8. Hand Dryer | Dyson Airblade dB, AB14-G
Excel Xlerator
Saniflow Automatic Mediflow |

- B. All toilet accessories and their installation, must comply with ADA requirements for reach, operation, and wall projection.
- C. All toilet accessories model numbers should be confirmed during specifications. Any updates or necessary revisions must be coordinated with the County Project Manager.

11000 - EQUIPMENT

I. DESIGN

- A. Specify gas clothes dryers whenever gas service is available, subject to using Agency concurrence. Voltage for clothes dryers shall be 208/277.
- B. Coordinate voltages for washing machines and dryers between electrical plans, specifications, schedules, and disconnects.
- C. Commercial washing machines and dryers must be bolted to a minimum of a 4" level concrete pad; and will be provided with vibration isolators, as required. Any washing machines which are to be located on an elevated, structural slab must be analyzed for harmonic impacts in conjunction with the structural plans, and the appropriate vibration isolation or dampening provided.
- D. Coordinate design of exhaust flues for dryers with dryer manufacturer.
- E. Direct exhaust fumes away from air conditioning intakes.
- F. Provide floor drains at all public toilet rooms, laundry rooms, equipment rooms and janitors closets. Design floors to provide positive drainage to floor drains.
- G. Equipment plans for any kitchen equipment must be closely coordinated with electrical power drawings to ensure consistency between power requirements and power provided. Use gas kitchen appliances when gas service is available, subject to using Agency concurrence.
- H. Ranges
 - 1. Gas fired ranges shall use an electric spark ignition – no standing pilot lights.
 - 2. Provide 30" ADA pull-in access adjacent to range
- I. In Type I kitchen hoods, the A/E shall specify the following:
 - 1. A heat sensor shall serve as an interlock between the kitchen hood exhaust fan and the cooking appliances to automatically activate the exhaust hood system whenever cooking operations occur.
 - 2. Any make-up air systems that are required for the hood exhaust system shall be interlocked with the kitchen hood exhaust fan to automatically operate whenever the exhaust fan is energized.

3. A solenoid valve shall serve as an interlock between the gas piping supplying the cooking appliances below the kitchen exhaust hood and the hood fire suppression system, to automatically activate gas shutoff in the event of a fire. The valve installation shall meet the Fire Marshal requirements.
 4. The gas fired ranges shall use a spark ignition with no standing pilot light. (Relocate this paragraph with Ranges)
 5. Electric ranges shall comply with similar ventilation requirements as noted for gas ranges.
- J. All fixed equipment and appliances shall be high-energy efficiency and carry the Energy Star® label, where available.
- K. Design of dividing partitions in meeting rooms must be carefully reviewed to accommodate life safety requirements for exiting from all areas as required. Use of automatically operated partitions is acceptable however, must be reviewed with the room conditions to determine if necessary for the size and height of the room.
- L. Security Systems
1. The A/E shall coordinate with the County Project Manager for security requirements applicable per project.
 2. The design shall incorporate the principals of Crime Prevention Through Environmental Design (CEPTED), or equivalent.
 3. Exterior cameras, if included, must not be blocked by trees when mature.
 4. Exterior cameras, if use, must be coordinated with site lighting to ensure ample night time ambient light and not create hot spots.
 5. Site Surveillance System Requirements

Site surveillance will be accomplished using fixed and/or Pan Tilt Zoom (PTZ) Closed Circuit Television (CCTV) cameras. Video from the Visual stations will be routed to the Digital Video Recording (DVR) System. The CCTV system should be designed to provide remote visual surveillance of the building and grounds from the local control post within the building and from offsite locations through the County's communications infrastructure.

a. Site Surveillance Cameras

Fixed and PTZ cameras will be dome type cameras with smoked, high impact polycarbonate lower sections. The cameras should be visible to gain the deterrent factor; but not obtrusive when being located. The smoked lower section also

prevents people from knowing the field of view of the camera, increasing its effectiveness as a deterrent. The cameras will be wall, pole or ceiling mounted.

b. Digital Video Recording System

The system will be designed to digitally record, store and retrieve video images. The capture and storage of video data will be designed with minimum frame rates and resolution settings as established herein. Storage capacity requirements are driven by the frame rates and the resolution of the recording. The current standard for digital video recording systems is the Integral Technologies solution. Integral Technologies Digital Sentry Network Video Recorder (NVR) will accommodate the 4 CIF resolutions at up to 15 ips per camera. This is a network based product that will offer adequate performance locally and allow enterprise functions such as remote (off site) viewing and playback.

c. Security Cameras

The County only uses Pelco, Sony, and Axis for their security cameras. These are generally not sole sourced, but specified as limited procurement; no equal products. It is imperative that the equipment be compatible with the existing security cameras in the County, which is made up of exacqVision DVR's and NVR's, and has the capability of switching components and be interchangeable with existing video equipment to assure operability of the existing monitoring and recording systems. Also spare parts will be available in the existing stock and time to troubleshoot and perform maintenance will be minimized. The County also uses Onssi Systems for the software controlling the security cameras in larger facilities.

Fixed cameras should be high resolution, color, 1/4" interline transfer CCD cameras with 470 TV lines horizontal (NTSC) minimum resolution in both day and night modes, .45 fc minimum illumination, automatic backlight compensation, automatic gain control, and provided with mounts/housings appropriate to the locations and environmental conditions in which they are mounted.

Pan, tilt and zoom (PTZ) dome cameras should be high resolution, color, 1/4" interline transfer CCD cameras with a minimum of 18X optical zoom lens with up to 12X digital zoom magnification, continuous fulltime auto-focus, day/night operational modes, minimum resolution of 470 TV lines horizontal (NTSC) in both day and night modes, better than 0.25 lux (slow shutter off) and 0.016 lux (slow shutter on) in day mode, better than 0.031 lux (slow shutter off) and 0.002 lux (slow shutter on) in night mode, and capable of providing detailed images when video frame encompasses areas of bright light and darkness. The pan/tilt drive should be variable speed and capable of 360-degree continuous rotation. Tilt range should be greater than 95 degrees minimum and pan speed, at minimum, 120 degrees per second. The pan/tilt drives should have the ability to store presets. Each preset shall have a preprogrammed position for, at minimum, the pan angle, tilt angle, and zoom lens angle of view.

A darkened distortion-free outer dome to preclude visibility of which way camera is oriented should protect the entire camera's field of view. The housing must completely enclose the surveillance device. Housings should be wall, ceiling, parapet, pole, and/or column mountable. Mounts should have a load capacity of at least twice the combined load of the mounted components including the mount itself. Outdoor cameras should be provided with and installed in weather-proof housings equipped with heater/blower and capable of operating up to 122 degrees F and 100% relative, condensing humidity. The digital video recorders being used in the county are exacqVision DVRs (Digital Video Recorders, made by Pelco), which has the capability of handling 32 cameras.

II. PRODUCTS

- A. Device and Manufacturer Information for Camera Systems. Verify with the County Security Manager for most current manufacturers and models.

Device Description	Manufacturer
1. Pan Tilt Zoom Camera	Pelco
2. Fixed Dome Camera	Pelco
3. Camera Power Supply	Pelco
4. Network Video Recorder	Exacq Technologies (exacqVision)
5. Video Encoder	Exacq Technologies (exacqVision)
6. Video Decoder	Exacq Technologies (exacqVision)
7. Video Acquisition Unit	Exacq Technologies (exacqVision)
8. Ethernet Switch	Cisco
9. System Manager	Exacq Technologies (exacqVision)
10. Client Work Station	Exacq Technologies (exacqVision)
11. Analog Video Monitor	Pelco

12000 - FURNISHINGS (Free Standing and Systems Furniture)

I. DESIGN

- A. All system furniture provided on Fairfax County projects is to be specified to have a County standard fabric pattern. The standard pattern is “Labyrinth; Pebble” by Knoll. Fabric specifications must be coordinated with the County Project Manager and FMD. Low VOC fabric shall be specified.
- B. The plans must clearly show whether the Contractor or the Owner is responsible for making the final electrical connection of the systems furniture whip (pig tail) to the electrical junction box. This may be performed by the Owner (FMD); however, it must be coordinated and clearly shown on the documents. The Architect is required to obtain the permit for the system furniture.
- C. All free standing furniture to be specified from products on County furniture contracts.
- D. Accessible Design
 - 1. Evaluate use of seating/benches in lobby or main entrance areas, and seating near elevators.
 - 2. Provide adjustable podiums/lectern for accessibility (seated/small persons) where provided. This may be fixed equipment or Owner provided loose equipment item.
 - 3. Provide enough circulation space around fixed and loose furniture to enable easy movement by all users, including people with wheeled mobility devices. Evaluate this requirement as part of the schematic loose furniture layout plan.

II. PRODUCTS

- A. Systems furniture shall be designed based on the companies currently under contract with the County:
 - 1. Manufacturer: Knoll
 - 2. System: Morrison
 - 3. Installer: Per County Contract as coordinated by Owner.
 - 4. Colors shall be as follows:
 - a. Laminate: FOG
 - b. Overheads/Files: Fairfax Grey (front)/Light Grey (case)
 - c. Fabric: “Labyrinth; Pebble
- B. Coordinate with County Project Manager and FMD to assure conformance to County space standards and workstation configuration standards.

13000 - SPECIAL EQUIPMENT

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14000 - CONVEYING SYSTEMS

DESIGN

- A. All elevator equipment shall be “non-proprietary” equipment that is serviceable and maintainable by any qualified elevator maintenance provider capable of maintaining apparatus of similar design and complexity. One of the following controller manufacturers is required using limited procurement, no substitutions/no equal products: Motion Control Engineering (MCE); Computerized Elevator Control (CEC); GAL Manufacturing. (Note: The listed companies manufacture control equipment, but do not install elevators. If required, most elevator companies can procure “non-proprietary” equipment from one of these manufacturers and do the installation.)
- B. All service tools, programmers, computers, software chips, etc., necessary to maintain service and/or troubleshoot the elevator system shall be furnished to the County and shall be permanently left on the job site. This hardware and software shall not have any time limits or expiration dates set on them. The elevator equipment shall not require any external proprietary service tool(s). A minimum of three copies of all instructions manuals for these tools, programmers, etc. are to be provided to the County.
- C. Copies of all technicians’ manuals, wiring diagrams, training materials, etc. for all elevator components shall be furnished to the County for each model of elevator. A minimum of three copies shall be provided for the main bank of elevators of each model, and one more copy for each additional elevator in the building.
- D. All large multi-story buildings shall have a designated “Freight Elevator” with direct and convenient access to a loading dock or freight entrance. The exact requirements for elevators will be determined during the Programming and Conceptual Design phases.
- E. A full, two-year warranty for labor, parts, and materials shall be provided for elevators from date of substantial completion. The installer shall provide full maintenance service and inspections during the two-year warranty period for elevators.
- F. Provide sump pit and pump in elevator pits as required by elevator code (ASME A17.1) Provide pumping mechanism which prevents oil in elevator pit from being pumped out, as required by code.
- G. Provide vandal resistant fixtures for all elevator hall station panels and car operating panels.
- H. For garage elevators provide water resistant components in areas that are not temperature controlled, to include hall station panels, car operating panels, infra-red door edges/light screens, position indicators, hall and car lanterns, pit stop switches, hoistway limit switches, interlocks, leveling selector, stainless steel or galvanized selector tape, car top

inspection station, and emergency phones. Recommended manufacturer is C.J. Anderson & Company.

- I. For garage elevators, to resist corrosion use Type 316 stainless steel or galvanized for car doors, hoistway doors, door bucks, and fixtures. Use minimum 16 gauge stainless steel or galvanized.
- J. Fire service keyswitches for all elevators in a building, including additions to existing buildings, shall be operable by the same key as required by elevator code.
- K. Shunt trip disconnect shall be used in elevator machine room, not panel board, per code requirements.
- L. Provide protective cages for light fixtures in elevator machine rooms.
- M. Contractor is responsible to provide, install, and wire the emergency elevator phone.
- N. Any surfaces that project out into the elevator shaft must be angled from the wall surface down. No flat surfaces in the horizontal plane are allowed in the shaft.
- O. Specifications shall require that the contractor comply with County (Facilities Management Department) maintenance protocol for all maintenance and inspection work performed.
- P. Specifications shall require the use of energy efficient AC motor technology for elevator motors.
- Q. In buildings with more than one elevator, escalator, or lift each piece of equipment shall be assigned a unique identification number as required by elevator code ASME A17.1. When adding an elevator, escalator or lift to an existing building, or when adding equipment in a new wing of an existing building, the new identification numbers shall start at a number higher than the existing numbers (do not start over at #1).
- R. Elevator penthouse and/or roof top access shall be limited by key and/or access control card. A method to override the access card or keyswitch shall be provided to allow unrestricted access during special projects or events.
- S. All lighting in elevator cabs, machine rooms, and pits shall be energy efficient LED fixtures.
- T. Elevator doors must be double-sided, not single-sided. Door hangers must be separate components from the doors, and not be an integral part of the doors.

U. Accessible Design

1. Evaluate use of verbal communications in lieu of chimes within elevators. Provide required ADA brail.
- V. Escalators shall be provided with on-board or built-in diagnostic service tools. All service tools, programmers, computers, software chips, etc. necessary to maintain, service, and or troubleshoot the escalators shall be furnished to the County and permanently left on the job site. This hardware and software shall not have any time limits or expiration dates set on them. A minimum of three copies of all instructions manuals for these tools, programmers, etc. are to be provided to the County.
- W. A full, two-year warranty for labor, parts, and materials shall be provided for escalators. The installer shall provide full maintenance service and inspections, during the two-year warranty period for escalators.
- X. Any other conveying systems (wheelchair lifts, dumbwaiters, materials lifts, etc.) shall have a full, two-year warranty for labor, parts, and materials. Other conveying systems shall include full maintenance and inspections by the installer during the two-year warranty period.
- Y. Copies of all technicians' manuals, wiring diagrams, training materials, maintenance manuals and procedures, etc. shall be furnished to the County for each model of conveying system. A minimum of three bound hard copies and two electronic (CDR or DVD) copies shall be provided.

II. PRODUCTS

A. Conveying Systems

1. Below are listed preferred equipment brands for parts of conveying systems (specifications shall include at least three acceptable equipment options for competitive bidding, unless a limited sole source procurement or no substitutions/no equal products is approved in writing by the County Project Manager):
 - a. Elevator Motors: Imperial (preferred), Baldor, Reuland, or Leroy-Somer.
 - b. Traction Machines: Hollister-Whitney.
 - c. Governors: Hollister-Whitney.
 - d. Hydraulic Pumps: Allweiler (preferred), EECO, or IMO.

- e. Sump Pumps: Zoeller Oil Smart System, Seewater Oil Smart System, Stancor Elevator Oil-Minder Control System, or product approved by the Fairfax County LDS Plan Review and Inspections Division
- f. Oil Alert System: Dorlen Oil-Alert Liquid Leak Detector or product approved by the Fairfax County LDS Plan Review and Inspections Division.
- g. Hydraulic Valves: Maxton (preferred), Blain, or EECO.
- h. Fixtures: Innovation (preferred), GAL, EPCO, Monitor (Janus), or C.J. Anderson.

15000 – MECHANICAL/PLUMBING

I. DESIGN

A. A/E Coordination

1. Mechanical equipment shall be located on the ground floor and provided with double doors. Paved access for maintenance vehicles shall be as close as possible. Rooms shall be of sufficient size for all required clearances and all proposed piping and duct layouts. Travel paths shall be clearly indicated which present no to minimal obstacles for equipment replacement and servicing. Where it is not practical to design equipment rooms on the ground floor level, the room design, and if necessary adjacent spaces, shall incorporate clearly defined provisions for equipment replacement and servicing. Mechanical rooms that serve as air plenums shall be designed according to prevailing code and be void of combustible materials. Where practical and as directed by the County Project Manager, the floor shall be painted or otherwise treated with an industrial grade, slip resistant, water proof type coating of a light gray color and curbs and equipment pads painted/trimmed out in yellow color slip resistant, industrial grade treatment. Rooms shall have proper drainage depending on the type of equipment housed. Where there is equipment to be cleaned, etc., there shall be a $\frac{3}{4}$ " hose bibb with backflow protection. Noise attenuation measures shall be incorporated into the design of the mechanical room(s). Equipment rooms must be weatherproofed and have secured locking hardware.
2. Refer to the Mechanical Code for requirements to provide guardrails at the edge of roof areas adjacent to rooftop equipment that require maintenance access at the roof level. If guard rails are unavoidable, Architect is to indicate and specify railing that is compatible with the building's structure and aesthetics.
3. All roof levels shall be accessible for maintenance. Roof walkways must be provided in all expected travel areas and around roof mounted equipment. Provide platforms around cooling towers and other HVAC units elevated above roof surface. Ladders must be provided to all roof levels and interior ladders are preferred where practical. Refer to section G.2.b for detailed access criteria.
4. In ceiling areas where HVAC equipment, such as VAV boxes, need to be located, A/E shall provide appropriate ceiling space such that equipment, dampers, valves, etc., can be easily accessed for maintenance. Ceiling access shall be accessed no greater than that required from 8' step ladder. For inaccessible ceilings, the Architect shall indicate and specify compatible access panels of sufficient size that have been coordinated with the Engineering layout and requirements. It is permissible to specify cable operated volume dampers for individual air devices where access panels may be less desirable. Equipment shall be a minimum of three feet from a wall.

5. Where built-in systems (furniture and/or shelving) are planned and basic layout can be determined, VAV boxes/AC equipment shall be located above the walkways and not directly over furnishings that cannot be easily moved.
6. Buildings with tall, vaulted attic spaces require close coordination between Architect and Engineer. Use of attic space as an air plenum is not permissible. Design and specify ducted supply/return systems where ductwork must traverse through an attic space or within vaulted elements. For “flat” ceiling applications, plenum returns are preferred unless there are compelling reasons for ducting back to the air mover(s). Where ceiling return air plenums are utilized, coordinate the design intent and use of return air light fixtures and other architectural return air measures with the project manager. The A/E shall coordinate all full height walls, obstructions, and prevailing code requirements such that the return air plenum is viable.

B. Submission Requirements

1. The A/E shall send building load letters and plans to the electric and gas companies at appropriate times during design.
2. A/E shall submit cut sheets for the major equipment components which form the basis for design, at the Design Development phase. The cut sheets must identify equipment dimensions. The drawings shall include detailed part plans and section views (1/4" = 1' or larger scale) dimensioned to show the major equipment, duct work, and piping located within the mechanical spaces. Detailed plans must reflect that adequate space and clearances are provided for inspection, maintenance and replacement access, and all major mechanical equipment. It is preferred that these clearances be indicated by light dashed lines.
3. A/E shall use eQuest, Trane Trace, DOE-2 or other pre-approved equivalent building simulation programs to conduct energy modeling to aid in preparing a life-cycle cost analysis for mechanical system selection, optimized building orientation, architectural shading methods, building envelope characteristics, and day lighting options during the Schematic/ Design Development phases. The Owner and A/E shall meet to determine what options shall be evaluated and to review costs/benefits of various design alternatives. The A/E shall provide the Owner an annual energy budget model based upon the computer simulation. Report shall include the program outputs and list of input assumptions.
4. The following parameters shall be used for evaluating life-cycle cost analysis.
 - a. 5% discount factor for capital costs.
 - b. Utility escalation rate should be discussed at the time of the study as they can vary widely and have a big impact on life cycle analysis. 3% escalation rate has been used recently.

- c. Study period shall be for 30 years. When packaged roof top equipment is used, which has a 15 year life cycle, assume a 15 year replacement.
 - d. All life cycle costs shall be in “Present Worth” format.
- 5. The A/E shall confirm design conditions early in the project and submit all heating and cooling load calculations for review by the end of Design Development. Revised load calculations shall be resubmitted to the Owner as required to reflect revised loads based on Owner & HVAC Peer Reviewer comments.
 - 6. Provide a points list and sequence of operations for each project.
 - 7. Show North arrow on all Mechanical plan sheets for all submissions.
 - 8. For building footprints too large to fit on a single plan sheet, provide a key plan on all plan sheets. Provide a key plan on any sheet where partial plans are utilized and indicate in a light hatch pattern for the area(s) of work. Where feasible, maintain same building orientation for all plans and include column lines even on key plans, as applicable.
 - 9. Provide outside air calculations by no later than the 50% CD review.
 - 10. Equipment schedules shall contain capacities required by load calculations and capacities of proposed equipment. This applies for heating and cooling BTUH’s and GPM. This will allow the county to more easily verify that equipment has not been oversized (requirement of IECC) and facilitate future equipment replacements based on actual required capacities instead of what was installed.

C. Plumbing

- 1. In addition to the code required locations, provide sanitary sewer clean-outs at each end of building at main sanitary sewer trunk lines.
- 2. Provide accessible sanitary sewer cleanouts in all locker rooms and rest rooms.
- 3. The following criteria is to be included in the Plumbing system specifications and indicated accordingly on the plans:
 - a. No plumbing piping is to be installed over electrical panels or other distribution equipment, unless in compliance with NEC limitations.
 - b. No plumbing piping is to be installed over server or data room equipment or books in libraries.

- c. Freeze proof, lockable/keyed, $\frac{3}{4}$ " hose spigots with backflow prevention shall be provided near outside and rooftop mechanical equipment, to include a shutoff valve with air vent placed upstream of hose spigots. For applications where a roof hydrant is the only option, specify and detail a support system and indicate robust roof sealing so as to prevent pooling and leaks at the roof's penetration.
- d. Make-up water supply for the cooling tower and any irrigation systems shall be sub-metered to reduce monthly sanitary sewer costs. Provide a manual bypass for the automatic fill.
- e. Lavatories at all publicly accessible restrooms shall have hard wired infrared sensor controls and grid drains. Lavatories and pantry sinks in staff only areas may have manual controls and grid drains.
- f. All piping that will gain or lose energy to/from the surrounding atmosphere, or may cause condensation problems, shall be properly insulated to minimize energy costs and condensation problems. All roof drain bodies and horizontal piping including the down turn elbow shall be insulated. All pipe insulation joints must be properly sealed.
- g. Electric heat trace, tape system shall not be specified for domestic hot water systems. Avoid long runs of hot water piping, but where impractical provide hot water circulator pump and recirculation piping of at least $\frac{3}{4}$ ". Unless determined otherwise, it is permissible to control the pump's operation with an aqua stat.
- h. Domestic tank type water heaters shall have glass lined tanks.
- i. Floor or trench drains shall be installed for intentionally level floors and shall be shown on drawings.
- j. Provide pressure gauges at high points of piping branches and/or points furthest away from building's source. Provide an isolation valve up-stream of pressure gauge. Indicate locations on the riser diagrams as well as on plans.
- k. In restrooms, coordinate the requirement for a centralized floor drain with the County's project manager. Utilize a "water saver" type trap primer directly connected to a nearby lavatory tailpiece to avoid the maintenance associated with mechanical trap primers.
- l. Fixture units shall be tabulated on drawings. Where fixtures have been demolished, demolished fixture units shall also be tabulated on drawings.
- m. As a general rule, garbage disposers are not permitted in commercial applications. They will be considered and approved by the County's Project Manager on a case by case basis for applications such as fire stations and other residential facilities where the end user will be solely responsible for their servicing.

- n. Gas piping shall be painted bright yellow with a minimum of two coats of industrial grade enamel. Domestic piping shall be labeled with use and flow directional arrows on the exterior of the insulation. Drainage piping shall be labeled with use and flow directional arrows.
- o. A programmable digital time clock (located next to the unit) may be utilized to minimize water heater “standby” losses during the building’s unoccupied schedule. Indicate time clock on electrical plans for coordination purposes.

D. Fire Protection

- 1. Sprinkler System to be designed, installed, and tested in accordance with all applicable codes and reviewed and approved by local authorities having jurisdiction. Contractor is responsible for all shop drawing review fees and permit fees charged by the Fire Marshal's office.
- 2. Sprinkler piping is not to be routed over top of electrical panels or equipment, except as specifically permitted by NEC.
- 3. The inspectors test valve shall be located in a readily accessible location. This is essential to minimize the impact to the user agencies during the cyclic testing. Provisions for discharging the water during the cyclic system test shall be made by piping the drain to the exterior of the building. The use of buckets for cyclic testing is not acceptable.
- 4. Sprinkler devices, valves, etc., shall be permanently tagged noting the device and its purpose. Valves or devices that are located above accessible ceilings shall be marked at the ceiling level indicating a device or valve above.
- 5. The use of McDonnell & Miller flow switches for the sprinkler system is unacceptable. These are not rated for use with fire alarm systems.
- 6. Do not specify any currently or previously recalled sprinkler heads for use on any Fairfax County project without prior, written approval from the Fairfax County Fire Marshall.
- 7. Specifications shall require contractor to provide appropriate quantities of spare sprinkler heads and spare sprinkler head wrenches (for each type installed) as required by code.
- 8. All sprinkler piping shall be Schedule 40. Schedule 10 is not acceptable as it tends to fail after a few years with pinhole leaks.
- 9. All riser fittings and inspectors test line shall be brass ball valves.

10. All 2" main drain lines shall be piped to the exterior of the building. This is necessary to facilitate the annual testing and maintenance of the lines. The floor drains will not handle the rate of flow required for the Fire Marshall's annual test and recertification.
11. Dry sprinkler valves shall be installed so that a proper test, reset, and maintenance can be performed from one location. Pressure gauges, drains and valves shall be installed as required to accomplish this.
12. Use of dry sprinkler systems is discouraged and should only be used where required by code or operational requirements due to high maintenance and expensive repairs. If used:
 - a. Specify self-restorable valves to be reset by County's FMD staff.
 - b. Specify oil-less type air compressor.

E. Main Fuel Tank, Day Tank & Piping for Diesel Generators duplex fuel oil pump arrangement is preferred.

1. Primary tanks and day tanks shall not be located or mounted on the same frame as the emergency generator. The Day Tank shall be mounted on a slab on grade, independent of the emergency generator. Simplex Day Tanks are preferred; Tremont Day Tanks are not acceptable. For an exterior Day Tank, provide Day Tank heater and heat tape on fuel lines, as necessary. A secondary fuel pump shall be provided for the return line from the Day Tank to the Main Fuel Tank as an integral part of Day Tank, as required.
2. Packaged units with main fuel tanks, sub-base fuel tanks, belly tanks, on-board tanks or rail mounted tanks are not acceptable. All fuel piping and fuel tank designs should be approved by the system manufacturer of the generator set. Copper piping is not to be used for fuel supply or return. Fuel oil return piping must be provided from the generator to the Day Tank and from the Day Tank to the Main Fuel Tank.
3. The main fuel tank shall be a separate component, and shall either be a buried double wall tank or an approved above ground storage tank (AST) mounted on a slab independent of the generator in accordance with UL listing. The AST shall be securely bolted to the slab and properly grounded.
4. Fuel system piping shall be black pipe and painted with Corrosion-resistant black paint. Fuel return line piping must be properly sized as per manufacturer's recommendations. The fuel piping and the electrical conduit between the generator and the Day Tank and fuel piping between the Day Tank and the Main Fuel Storage Tank shall be routed to allow easy access around these items without conflict. In the event the fuel piping has to be elevated, provide a set of check valves and a shut-off valve in *each* of the sections (from main tank to day tank and day tank to generator) in order to be able to maintain the prime at all times.

5. Where a buried fuel tank is used, a foot valve shall be installed at the tank's lowest point, to prevent air from entering the system.
6. Where a diesel generator set is specified, provide a foot valve in the tank at the lowest point in the piping to prevent the possibility of air getting into the system.
7. The minimum size for the diesel fuel tank to support only the generator shall be 500 gallons or the fuel tank shall be sufficiently sized to fuel the generator for a period of 96 hours at full load capacity assuming the tank to be full at $\frac{3}{4}$ capacity at all times. The installer shall provide a min. of half tank of fuel at the time of generator startup.
8. The Day Tank shall be specified with a hand pump for emergency operation. The day tank piping shall be provided with unions so that the Day Tank may be isolated and replaced without redoing the piping. The return lines shall have no valves, as required by code.
9. Above ground Fuel Storage Tanks shall be located at or near grade and shall be easily accessible for ease of maintenance and repair. There should not be any obstacles to accessing the generator with dollies and 55 gallon drums.
10. Main fuel tank, Day tank and fuel lines shall be installed by a certified contractor in accordance with manufacturer's installation requirements and the requirements of the NFPA, IBC, NEC. The main fuel tank and Day Tank may be painted with the same color as that of the generator.

F. Heating, Ventilation and Air Conditioning System Selection

1. The A/E shall coordinate with DPWES and FMD prior to selection of the mechanical system.
2. Where building size and use require complex multi-zone comfort systems, central plant configurations are preferred. In such cases, the basis of the heating and cooling system shall incorporate the following:
 - a. Centrifugal chillers above 120 tons and scroll or screw type chillers below 120 tons supplying chilled water, with VAV air handling units are strongly preferred.
 - b. A four-pipe system is preferred.
 - c. Firetube hot water boilers supplying hot water to perimeter baseboard or VAV terminal mounted heaters and air handlers (use hot water coils for morning warm-up) should be used for the heating system. For VAV systems, the decision to use terminal unit electric reheat will be made on a case by case basis.

- d. The use of condensing boilers is preferred for new installations. For retrofits, the use of condensing vs. non condensing boilers will be made on a case by case basis. Multiple boilers should be incorporated for redundancy.
 - e. Temperature controls shall be Direct Digital Control (DDC).
 - f. Chillers should be located in an enclosed mechanical room. Provide refrigerant monitoring, detection, alarms, and ventilation as required to meet Mechanical Code requirements and ASHRAE standards. Smaller chillers that use scroll compressors can be packaged units located outdoors but must be designed to include glycol to prevent freeze-ups and/or the need to drain/fill the system seasonally. CFC and HCFC refrigerants are not to be used in mechanical equipment on County projects. The County goal is to achieve the LEED Enhanced Refrigerant Management Credit, and the use of HFC refrigerants is strongly encouraged.
 - g. AHUs located in mechanical rooms are the owner's preference to achieve extended AHU life cycle.
 - h. The County has had difficulty with chilled water units located above the roofline, even with electric heat tracing. Avoid locating chilled water units above the roof line. Specify glycol and for piping to enter the unit directly below the unit, when no other acceptable options are available.
 - i. Avoid designs that require boiler operation in the summer. County boilers, typically, are not run during the summer months.
 - j. Avoid designs that require chiller operation during the winter. Any space that requires 24/7 cooling should use a DX system. County chillers typically, are not run during the winter months.
- 3. In small, less complex buildings, VAV or constant volume roof top units with natural gas heat (where available) and DX cooling are acceptable.
 - 4. Where commercially available, DX units shall have multiple compressors or unloading capabilities to avoid excessive cycling of compressor(s). Hot gas bypass may be utilized where appropriate, such as with single compressor units.
 - 5. VAV systems are preferred for indoor comfort control (humidity). Avoid VVT systems. Where commercially available, provide hot gas reheat for humidity control.
 - 6. Where natural gas is not available, packaged air to air heat pump units with 100% electric back up are acceptable.
 - 7. Where airflow monitoring stations are required, use "thermistor in tube" products and tie into the building's energy management system for "real time" air flow and temperature monitoring. Otherwise, avoid designing systems that require airflow

monitoring stations for fan speed or system control. Fairfax County has experienced installation, calibration and clogging problems with these systems. If a return fan is used, consider return air fan speed being based on supply fan speed, pressurization offset and actual fan curve characteristics, and the position of the outside air damper and calculation. Use gravity relief dampers where possible. Incorporate motor operated damper in series with barometric backdraft damper.

8. Supply air shall be directed away from thermostats. Thermostat locations must be shown on the drawings. Before locating thermostat, coordinate thermostat locations with loose and fixed furniture plans to avoid conflicts and poor sensing capabilities. For exterior zones, avoid locating thermostat too far from the exterior wall.
9. Interlock exhaust fans with associated AHU to assure they are included in controls package and don't run continuously. This will also save control points.
10. For telecommunication rooms, provide HVAC systems capable of maintaining the temperature between 72 and 74 degrees F and 50% relative humidity. Independent split system units are acceptable where appropriate to the facility's operations. The unit may be wall mounted, located above the door.

G. Heating, Ventilation and Air Conditioning Design Criteria

Optimal design will emphasize energy efficiency, accessibility, and maintainability.

1. Energy Efficiency

- a. The HVAC system shall meet all building code requirements for heating and cooling loads. Building envelope components shall be designed for energy efficiency in compliance with ASHRAE, IMC, and other applicable building and energy codes. Special attention shall be paid to the International Energy Conservation Code requirements for equipment sizing criteria.
- b. The HVAC designer shall pay close attention to actual building occupant load patterns and anticipated actual building loads to ensure that the system efficiently meets these requirements. Fairfax County has had problems with systems that meet the code requirements but do not effectively heat, cool or dehumidify the building in actual loading conditions. A/E shall:
 - i. Use all code approved methods to reduce occupant loads to match actual conditions and to reduce fresh air quantities to lowest possible levels. For libraries, remove square footage of permanent stacks prior to applying code required occupants per square foot. Use occupant averaging, room volume, transfer air techniques or other approved code methods to reduce fresh air requirements. This is mandatory for all meeting rooms, conference rooms, or other assembly areas. Use DPWES occupancy load program to calculate

outside air quantity reductions for variable and intermittent occupancies where possible. Coordinate with the County Project Manager, or contact Building Plan Review in County's Land Development Services to obtain the most current copy.

- ii. In buildings with fixed shelving and stacks, such shelving and stack floor areas, must be deducted from the net square foot calculations.
 - iii. Size cooling equipment to match actual building occupant load conditions.
 - iv. HVAC loads shall be based on actual lighting levels wherever possible. If actual lighting levels are not available at the time loads are calculated, lighting load shall be estimated by maximum lighting levels permitted by space type according to IECC. Do not use 2 W/SF as standard lighting level for all spaces.
 - v. Central plant equipment shall be sized for the building peak, not the sum of the zone peaks.
 - vi. If packaged DX equipment is used, they shall have multiple cooling and heating stages to meet part load conditions for proper humidity control. Design CFM range for DX equipment that serves occupied spaces shall be in the range of 340-360 CFM/Ton. Design CFM/ton for equipment that primarily serves equipment such as server rooms shall be at the equipment manufacturer's rate to adhere to the cataloged cooling capacity.
 - vii. HVAC systems shall be designed to limit indoor humidity levels in the cooling mode to approximately 50%.
 - viii. Provide HVAC zones for different functional areas and to allow for night use in appropriate areas.
 - ix. Where design loads for a space may vary significantly from actual loads, the system shall be designed with capacity reduction capability.
 - x. CO₂ sensors shall be provided to control amount of fresh outside air intake.
- c. Systems designed should maintain the following temperature settings:

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	<u>OCCUPIED</u>	<u>UNOCCUPIED</u>
General Office Space Heating	70°F	55°F
General Office Space Cooling	74°F	85°F
Warehouses/Garages/Apparatus	60°F	N/A
Data Center	74°F	78°F
Telecommunications Rooms	72°F	74°F

d. Outside Air Design Parameters (temperatures) for General Building Areas.

Winter	14°F
Summer	95/ 74°F

(Verify design temperatures with ASHRAE Standards.)

e. The building thermal envelope shall, as a minimum, be designed as follows:

Window U-Factor	0.50 Max
Average Wall U-Factor	0.10 Max
Soffit/Floors U-Factor	0.10 Max
Roof U-Factor	0.05 Max
	0.10 Max in storage/equip. rms.

Exterior envelope shall also have interior and exterior vapor barriers, and entire thermal envelope, including attic and plenum spaces, must be sealed to the exterior.

- f. Warehouses, garages and Fire Station Apparatus Bays should be provided with infrared tube heating systems and should not be air-conditioned. All infrared heat systems which have more than five burners shall be “Co-Ray-Vac” Class I serpentine infrared system manufactured by Roberts Gordon, or approved equal. Infrared heat systems with less than five burners can be specified as a Class II, open to several manufacturers. Whenever possible, eliminate or reduce the use of make-up air heaters. Use single bulb temperature sensors (Accustat) set at 65 degrees in lieu of factory infrared controls. Bring in un-tempered air at the ceiling level, with the infrared systems sized for the additional load. If make-up air heaters are used, specify modulating burners with a 65 degree discharge air temperature introduced at the ceiling level. Exhaust systems shall be automatically controlled by exhaust gas sensors. For maintenance garages, provide ceiling mounted commercial grade propeller fans for summer ventilation. For all bay door’s provide interlock to shutdown conditioning system in bay area(s) when a bay door is open.
- g. The use of air to air heat exchangers over energy recovery wheels is preferred. While the air to air exchanger does not offer latent heat recovery, it is more efficient in the long run, since it will continue to provide sensible heat recovery long after the heat wheel fails (which is typically less than 5 years).

2. Accessibility and Maintainability

- a. Planning and coordination is required during design and construction to assure accessibility to new mechanical equipment. The long-term equipment maintenance requirements must be evaluated so that reliable, sustainable, maintainable and replaceable mechanical systems are installed. This will help the systems operate efficiently and safely throughout the life of the building.
- b. Design shall provide for adequate access and work space to all HVAC equipment for maintenance, inspections, repairs, cleaning and replacement.
- c. Mechanical rooms shall, to the degree possible, be located on the ground level, at an outside wall with maintenance vehicle parking spaces and loading zone immediately adjacent to the mechanical room door. All major HVAC equipment shall be located in the mechanical room(s).
- d. Maintenance, repair, and replacement requirements must be carefully considered and evaluated, during the design phase, for all equipment mounted on the roof or located in the attic to assure reasonable and appropriate access.
- e. All HVAC equipment located in the ceiling such as VAV boxes shall have unimpeded access from an 8' step ladder.
- f. All HVAC equipment shall have accessibility details noted on the mechanical and architectural plans and specifications, including, but not limited to: walk-ways, cat-walks, access doors, maintenance areas, electrical disconnects, electrical control panels, VAV box maintenance areas, equipment coil, filter and belt access locations.
- g. The manufacturer's minimum clearance requirements shall be provided. At least 42 inches of clearance is required for maintenance around all mechanical equipment, unless otherwise recommended by the manufacturer, and allowed by NEC.
- h. Avoid locating ceiling mounted HVAC equipment over areas that would be adversely affected by daytime service, such as a kitchen.
- i. Air conditioning condensate drain piping shall discharge to a storm drain or directly outdoors. Liquid combustion byproducts from fuel fired boilers and furnaces shall discharge to an approved location in accordance with the appliance manufacturer's instructions. All condensate piping shall discharge to a location where it will not cause a nuisance. Piping shall be properly anchored. Condensate drains from rooftop equipment shall terminate directly at roof drain. Provide drainable P-traps for systems subject to freezing.

- j. Non-curb mechanical equipment shall be supported by platforms with pipe columns with umbrella flashings where applicable. Height of column should be a minimum of 8" above roof membrane.

H. Heating, Ventilation and Air Conditioning Specifications

1. Boilers - The specifications shall include:
 - a. Outside Air Reset - For non-condensing units, provide hot water reset based on outside air temperature by the use of a three-way mixing valve.
 - b. Combustion Efficiency Test - Burner shall be tuned up for maximum performance, including correct nozzle size, flame shape, and air damper adjustment for minimum excess air. Performance shall be verified via written results of an instrumented combustion efficiency test, including test data net stack temperature, percentage CO₂ or O₂ oil smoke spot or percentage CO, and total combustion efficiency percentage.
 - c. Boiler Water Flow - Consider boiler re-circulation pumps or injector pumps for boilers to maintain water flow. Re-circulation pumps shall maintain minimum flow in the boilers as recommended by boiler manufacturer. The water flow can be a problem where three way valves are used for outside air reset at warmer OA air temperature when most water is by-passed and the boilers have very low flow. Systems shall also be designed to avoid thermal shock to boilers at start-up.
2. Where removable printed circuit boards are provided, an extra set shall be furnished including description, manufacturer, and source of supply identified.
3. Provide spare relays for A/C units and identify manufacturer and source of supply (include in Operations and Maintenance Manual).
4. Provide one extra set of belts for each belt driven unit.
5. In designs where the number of similar sized VFD units exceeds 10 units, provide a spare VFD.
6. Use of lining for ductwork will be determined on a case by case basis. If possible, where required for acoustics, use perforated metal liner for inner wall or sound attenuator.
7. Provide two extra changes for each type filter. 2" pleated are preferred. Install new filters at Substantial Completion in addition to the two spare sets.
8. Provide proper set of any non-standard test tools/equipment and appropriate training for installed equipment. Avoid specifying non-standard test tools/equipment, as applicable.

9. The temperature control system and the energy management control system shall be provided by one manufacturer.
10. An instructional session shall be held after systems are functional to familiarize Fairfax County staff (FMD) mechanics with the design and construction of the system. Time shall be set up during the warranty period for "shake down" meetings as needed. Total instructional and "shake down" time provided by the design engineer and installing Contractor shall be coordinated with the Owner prior to bidding but shall not be less than six hours. Contractor shall video record all instructional sessions and provide the DVD to the Owner.
11. The specifications shall provide for a full one-year warranty period for all HVAC systems equipment and associated controls, in addition to more extensive standard warranties carried by the specified systems and equipment. Special or extended warranties must be evaluated and approved by the Owner during the design process.
12. If roof mounted A/C units are used, provide a power receptacle, an interior stepladder with hand rails, steps 12" apart and top step no more than 15" from opening up of roof hatch.
13. Provide wall mounted control diagrams in all boiler and mechanical rooms. The diagrams shall be framed and covered with Plexiglas, or laminated.
14. All valves shall be numbered with brass tags and referenced to operational instructions.
15. Provisions shall be made for metering of heating fuel oil consumption. Provide back flow preventers in fuel lines, as required. Exposed exterior fuel lines must be insulated/heated.
16. Coordinate with DPWES to notify FMD staff when system balancing is scheduled so FMD HVAC mechanics can observe the procedure.
17. Access panels or doors must be provided for any equipment located in all wall or ceiling spaces that may require maintenance, repairs, or modifications.
18. All equipment, smoke detectors, heat detectors, etc., which are located above a suspended ceiling must be clearly labeled at the appropriate location on the ceiling.
19. CFC and HCFC refrigerants are not to be used in mechanical equipment on County projects. The County goal is to achieve the LEED Enhanced Refrigerant Management Credit. Use of HFC refrigerants is strongly encouraged.
20. In DX units that have multiple compressors, cooling coils shall be intertwined.
21. All motors are to be NEMA Premium efficiency.

22. A minimum of three-foot clearance is required at electrical elements at VAV boxes, fan coil units, etc. per National Electric Code (NEC.)
23. All ductwork and piping that will gain or lose energy to/from the surrounding atmosphere, or may cause condensation, shall be properly insulated to minimize energy costs and condensation. All duct and pipe insulation joints must be properly sealed.
24. All hydronic piping shall be run in conditioned space to avoid freezing. Where it is unavoidable to run in spaces subject to freezing, thermostatically controlled electric heat tape shall be provided on piping. In cases where emergency generators are specified, the electronic heat tape shall be connected to the emergency generator.
25. Provide Aegis grounding rings for all motors controlled by a VFD.
26. Fire dampers shall be type B and are to be dynamic type.

I. Energy Management and Control Systems

1. In all buildings, a DDC energy management and control system (EMCS) shall be installed. For new control systems, the protocol shall be based on BacNet. System Database shall host on a server, and use Microsoft Internet Explorer or Netscape to remotely view system graphics, and monitor, control, and configure HVAC system and its properties. EMCS shall include Owner approved graphics including Floor-level graphics with links to equipment for each building system.
2. All EMCS building controllers shall have UPS backup for 24 hours and shall be connected to generator power where available.
3. The energy management and control system shall monitor and control HVAC operations and conditions, alarm abnormal conditions and index control modes and provide AHU optimized start/stop operations, and provide reporting and trend logs. The specific system requirements shall be reviewed with the County during design.
4. The plans and specifications for the EMCS and mechanical system must include a detailed points list showing all monitor and control points and identify all required software and hardware, and must also include a sequence of operations for major equipment and systems.
5. The EMCS must be capable of performing the following functions:
 - a. Monitor and Alarm Selected Conditions: Temperature; Pressure; Flow; On/Off, Start/Stop Status; Safety Control Status (Fire, Freeze, Smoke).

- b. Initiate Selected Control Sequences: AHU/Chiller/boiler/pump; Start/Stop; Occupied/unoccupied modes; Optimized Equipment Start/Stop operation, monitor total building electric usage and provide demand limiting routines as determined by Owner.
 - c. Building Lighting controls: Indoor and outdoor lighting to be controlled by BAS. Refer to Division 16000 for more information.
- 6. The EMCS shall not be directly involved in the local loop controls, and the local loops shall continue to operate if the EMCS fails.
 - 7. All EMCS components shall have surge suppression devices. Building controllers shall provide a service communication port for connection to a portable Operator's terminal (furnished by contractor). Each piece of equipment shall be controlled by a single controller to provide stand-alone control in the event of communication failure.
 - 8. The EMCS must be capable of alarming to, and allowing interface and programming by any compatible personal computer via the County's LAN. EMCS shall be expandable and be compatible with the electronic equipment controls. EMCS must have a security password/code for system entry and programming. A network RJ45 jack shall be provided for network communications over the County's LAN.
 - 9. Specifications shall require contractor to provide on-site operator display LCD panel for local interface and all required interface devices that may include laptop computer, and/or handheld devices. Provide submittal for interface device hardware and software to confirm system configuration and operating system for approval by Owner. Remote processing units shall be capable of communicating with the local terminal. Integrate the new site into the County's existing EMCS workstation server. Provide licensed software for the EMCS. Provide CD copy of graphics package and programming software to Owner and install at Owner's central EMCS control station.
 - 10. All control dampers critical to emergency systems operation shall fail to the position required to allow this system to operate (fail safe operation).

J. Commissioning

- 1. Requirements for the HVAC system commissioning process shall be included in the construction contract. An independent Commissioning Authority may be hired by the Owner through the Architect's contract. The ASHRAE standard or other industry recognized guidelines for commissioning shall serve as the basis for all HVAC commissioning and the guidelines will be tailored to the specific requirements of the project.
- 2. The Architect and Mechanical Engineer and Commissioning Authority will perform reviews of the HVAC system design from a commissioning perspective at all review

phases of the design process, and will cooperate fully with the Owner's Commissioning Authority throughout the design review process as applicable.

3. The contract specifications must clearly spell out the responsibilities of the General Contractor and all appropriate subcontractors relative to commissioning, and shall also define the role of the Commissioning Authority.
4. The Architect and Mechanical Engineer shall coordinate and cooperate fully with the Owner's Commissioning Agent and with DPWES representatives throughout the actual HVAC system commissioning process prior and subsequent to, system acceptance. The Architect and Mechanical Engineer shall provide all design and or system information that is requested by the commissioning team members and respond to all comments from the Commissioning Authority from design through system acceptance.

II. PRODUCTS

A. Mechanical Equipment Preferences

1. Below are listed preferred equipment brands for which supply of repair parts exist (specifications shall include at least three acceptable equipment options for competitive bidding, unless a limited source procurement is approved in advance by the owner):

- a. Chillers: Trane, Airstack or Carrier (coordinate with the Owner for the most recent updates)
(No Equals or Substitutions)
- b. Cooling Towers Baltimore Aircoil, Evapco, or Approved Equal
- c. Pumps: Bell Gossett, or Approved Equal
- d. Non Condensing Boilers: Natural gas/#2 oil Fired Burnham 4F or Approved Equal
- e. Condensing Boilers: Aerco, Veisman; or Approved Equal (based on technical specs including turndown ratio)
- f. Air Handlers: Trane, Carrier, AEI, Liebert, Valant or McQuay
- g. VAV Boxes: Titus, Trane, Nailor, or Approved Equal
(Electronically controlled)
- h. EMCS:
 1. Trane
 2. Siemens
 3. Automated Logic

4. Delta
(No Equals or Substitutions)

- i. Rooftop Units: Trane or Carrier
- j. Variable Frequency Drives: Yashikawa, Danfoss ABB, or Square-D
- k. Baseboard Heaters: Trane without Dampers, or Approved Equal
- l. Underground Storage Tanks: Double wall, urethane coated steel. Act 100U, Type II, and approved by U.L.58 for underground storage of motor fuel. Double wall welded steel with a primary (internal) tank and a secondary (external) tank; as manufactured by (Highland, General Industries or Approved Equal). UST shall include quick release filler neck; 9 water tight raised access to filler neck; and shall support accessory equipment including drop tubes, two tank sumps, and submersible removable pumps. UST design shall allow for continuous monitoring of the interstitial spaces between the two walls and the two manways.
- m. Fuel Storage Monitoring and Leak Detection System: Veeder Root Model TLS-350
(No Equals or Substitutions)
- n. Submersible Fuel Pump: Redjacket (submerged turbine); or Approved Equal
- o. Fuel Dispensers: Gas Boy (No Equals or Substitutions)
- p. UST Fill Caps and Overflow Devices: Ohio Pipe Works (OPW) Model 2100 overfill containment basin (5 gallon); or Approved Equal
- q. Fire Station Diesel Exhaust Extraction System: Plymovent (No Equals or Substitutions) A/E to specify appropriate temperature rating.

B. Plumbing Equipment Preferences

- 1. For plumbing systems, American Standard, Kohler, or Moen fixtures with Sloan or Zurn flush valves are preferred. Provide ball type shut off valves to isolate individual rest room areas and provide access to valves in janitor's closets adjacent to rest rooms.
- 2. All plumbing fixtures shall be specified and installed to be compliant with ADAAG requirements.

3. Provide service valves to enable segmented shutdown of building's water lines. Provide repair kit for any non-standard type plumbing fixtures and faucets.
 - a. Water Closets: Water closets should be floor mounted. Kohler, Model #k-4262-ET; or Approved Equal
 - b. Urinals Low flow as approved by Fairfax County Project Manager and as needed for water savings.
 - c. Faucets: Infra red sensor- auto type, hard-wired with battery back-up, in public restrooms. Manual in staff toilet rooms. No self-closing metering faucets unless required by code. No plastic handles or knobs. Sloan, Moen, American Standard, Kohler-Single lever, No Equals or Substitutions.
 - d. Flush Valves: Sloan or Approved Equal
Dual flush or low flow valve as appropriate to meet water savings requirements in water closets and urinals. Waterless urinals NOT permitted.
 - e. Frost Free Hydrants: Josam, Woodford, or Approved Equal
 - f. Vitreous China Fixtures: American Standard, Kohler, Zurn, or Approved Equal
Integral bowl w/ solid surface preferred.
 - g. Garbage Disposers: Insinkerator (I.E.S.); or Approved Equal
 - h. Valves: All valves 2" and smaller should be ball type valves
 - i. Dry Sprinkler Valves: TYCO or Viking
 - j. Domestic Water Heaters: AO Smith, State, PVI, or Lochinvar
(No Equals or substitutions)
 - k. Domestic Booster Pumps: Bell and Gosset, Tigerflow, or Ironheart
(No Equals or substitutions)
4. Specifications shall identify at least three acceptable plumbing equipment manufacturers for competitive bidding; unless otherwise noted herein, or unless limited source procurement is approved in advance by the owner.

III. CONSTRUCTION

- A. Coordination Drawings: On projects of substantial size and/or complexity, multiple-discipline shop drawings are to be provided by the Contractor and reviewed and approved by the design team. Drawings shall include all trades to be installed above, ceilings, in shafts, or exposed. Trades to be included but not limited to shall be Mechanical, Electrical, Plumbing, and Telecom.
- B. Record Drawings: As-built drawings indicating the final field installation of the mechanical and plumbing systems shall be provided to the County in the latest AutoCAD and .pdf formats.

16000 – ELECTRICAL

I. DESIGN

A. Electrical Main Services

1. Where appropriate a three-phase four wire 277/480 volt main service is preferred. A circuit breaker coordination study shall be provided when the complete single line diagram is established and with the final sizing of the main service. Two (2) sets of spare fuses for each phase shall be provided for the Main Service served by a Fusible Main Service Disconnect. Site Plans shall indicate the routing of the incoming electric utility lines from the supply source to the electric room in the building. A spare underground conduit shall be provided from the utility pole to the pad mounted transformer for high voltage lines, as required by the utility. A spare conduit shall also be provided from the utility pad mounted or pole mounted transformer to the CT cabinet for future use. All building wiring shall comply with the requirements of the Fairfax County adopted issues of the National Electrical Code (NEC).
2. Main Switchboard/Switchgear or the Main Distribution Panel (MDP) shall be provided with at least 25% spare capacity and space for future use. Provide a spare breaker corresponding to each nominal panel board size such as 100A, 225A, and 400A for building greater than 50,000 square feet. In all buildings less than 50,000 square feet in size, provide two spare breakers in the switchboard for future use as a replacement or addition for renovations. For 480 Volt systems, provide a spare 100 amp-42 circuit-120/208 Volt panel board with a built-in step down transformer.
3. The emergency power distribution system (Life Safety), without a generator or UPS system, shall be tapped ahead of the main and should have a disconnecting means with overcurrent protection and lock out capabilities for service and repairs. Emergency power systems shall comply with the 2011 NEC and NFPA 110 requirements.
4. To comply with OSHA's lock out and tag out requirements disconnects, panel boards and all other electrically powered equipment shall have a means of de-energizing and locking out the equipment for service and repairs.
5. Trapeze mounted transformers 75 kVA and above, shall have supporting structure that has been designed by a structural engineer.
6. Equipment rooms where switchboards, panel boards or transformers are installed shall be properly ventilated and conditioned to prevent ambient temperature from exceeding the listed environmental limits of the equipment residing in the space.
7. Data and communication rooms shall be designated as separate rooms from the electrical rooms. This is necessary to keep cable clutter, risk of electrical shock, heat,

- and EMF interference to a minimum. All data and communications rooms shall be provided with receptacles that are powered by standby generator circuit. No electrical transformers or distribution panels shall be permitted in telephone/data or communications rooms or closets.
8. The working space around electrical panels and other electrical devices must meet NEC requirements for clearance, and provide necessary space for access, although, the standard NEC required clearances may not be sufficient in all cases. The working space in front of electrical panels and other electrical equipment shall be sufficient to provide safe working space to minimize exposure to flash hazard.
 9. Access to the electrical panels and other electrical equipment shall be limited to qualified electrical staff by providing locks and appropriate signage to restrict direct entry and prevent flash hazards. A flash hazard analysis shall be done on all panels, switchboards, motor control centers and control panels and an arc flash hazard warning label be posted on these equipment in accordance with NFPA 110.16 and NFPA 70E as required by the adopted NEC. A circuit breaker coordination study and an arc flash analysis are required for all new and modified services.
 10. Specifications shall require installation of electric demand meters/monitors as part of the Building Automation System.
 11. Main Electrical Room lighting in non-generator or UPS powered emergency systems, and one 20 ampere duplex receptacle for all indoor main services shall be provided, and fed from the Life Safety Panel (ELS) which is connected from a tap ahead of the main circuit breaker of the service.

B. Riser Diagrams and Panel Schedules on Electrical Drawings

1. Specifications shall require the installing Electrical Contractor to provide 1/4"=1' scale layouts of all electrical and data/communications rooms showing Switchboard/Switchgear, MDP, panel boards and transformers prior to installation. This shall also be required as a submittal in the Submittal part of the applicable specification sections.
2. Indicate on each panel schedule as "Fed from -----". This designation shall be required to be shown on typed panel schedules posted inside the panels and labeled on the panel's front cover with an engraved phenolic plate, red background with white lettering, in the field by the installing Electrical Contractor.
3. Provide computed NEC demand load on all panels and sub-panels utilizing NEC demand factors as per panel schedule attached as 16000 - Exhibit #1. In addition show the load corresponding to the "feeder ampacity" and the "connected load" to determine the adequacy of the panel per NEC. A "Total Facility Load Analysis Table" based on the connected loads shall also be provided on the riser diagram at 100% Construction Documents submission.

C. Generator and Transfer Switches as Required

1. The A/E shall coordinate the requirements for the connection of building systems to the generator per project. New buildings shall have emergency equipment and distribution above grade and comply with Article 708 of the NEC for Critical Operations Power Systems requirements for equipment and materials used in the project. Existing facilities with new or reused equipment shall be installed above grade, in locations as allowed in Article 708 of the NEC. Branch feeders and circuits in existing facilities shall be installed in a method allowed by NEC 708.10, exclusive of the 2 inches of concrete requirement. In police stations all facility systems shall be on the generator with the exception of the air cooling system. Refer to Fire Station Design Manual for requirements on the fire stations. Coordinate with the County Project Manager for all other facilities.
2. The emergency generator system for new construction projects shall be designed such that load shedding is not required in order to pick-up the required connected emergency loads. Generator Systems to be refurbished or upgraded from the existing systems, where physical size constraints limit the generator size and/or the fuel tank capacity, load shedding shall be permitted (subject to FMD direction) to ensure critical operations portion of the building shall be energized by emergency power during an outage. Connected loads on the emergency system shall be limited to the minimum code requirements and other operational requirements. Provide generator sizing calculations and projected run time utilizing any of the manufacturer's available generator sizing programs.
3. Where load shedding is permitted, the operation of emergency egress and exit lighting, alarms and alerting systems, operations lighting, communications systems, sump pumps, automatic door operators shall be Priority Level I. Loads of refrigeration equipment, elevators, supplemental security systems and supplemental communication systems and disaster shelters shall be Priority II. Cooking equipment and non-essential operations shall be Priority Level III.
4. Where it is not required or not feasible to size the replacement generators and associated fuel supplies to power the entire facility, the generator shall power the emergency life safety system and designated standby power for elements of the facility in accordance with the Priority Levels established in the above paragraph. FMD shall designate which elements will receive direct emergency standby power and which elements shall be subject to load shedding.
5. Where an Uninterruptible Power Supply (UPS) or any non-linear loads are connected to the generator, proper allowances shall be made for such loads in the generator sizing computer program. Leading power factor equipment shall not comprise more than 40% of the generator capacity. Provide approximately ten percent (10%) spare capacity in the generator to carry future loads.

6. Evaluate emergency generator system to determine whether or not an air permit will be required based upon Virginia Department of Environmental Quality standards.
7. The specifications for the generator shall include the following items:
 - a. The Jacket Water Heater shall be provided with a set of water shutoff valves for all units to facilitate jacket water hose and heater replacement without the necessity of draining the engine coolant system.
 - b. The main circuit breaker shall be provided with auxiliary contacts to indicate light and alarm on the generator control panel and the Remote Generator Annunciator Panel (RGAP) when the main circuit breaker is in “OFF” position. Also provide a Red Mushroom “Emergency Stop Button” on the engine control panel. Depression of this emergency stop button shall trip the main circuit breaker and initiate generator shutdown.
 - c. Provide an “Emergency Stop Button” at the egress point of the generator room or enclosed space.
 - d. Specify that EPA Emission Levels shall be in accordance with EPA New Source Performance Standards (NSPS) regulations. Indicate manufacturer’s published emissions for the style, model and capacity of the generator provided on the drawings.
 - e. The mode switch located on the generator control panel shall be labeled “Run-Off-Auto” per NFPA 110. Provide contacts to indicate light and alarm when the mode switch is “not in Auto position” on the generator control panel and the RGAP. Provide for remote monitoring of the generator status to the fire alarm panel and be compatible with incorporation into and reporting to the County EDGAR software program.
 - f. The batteries shall be 4-D. Maintenance Free batteries are not acceptable.
 - g. The generator shall be required to meet Fairfax County Noise Ordinance Requirements at the property line. A/E shall stipulate what the maximum allowed db level is within the specifications.
 - h. Manufacturer’s recommended electronic interface device shall be provided to the Owner, by the contractor, for diagnostics on all new generators.
 - i. A 100 amp, single phase Generator Accessory Panel (GAP) with 8 (eight) circuit capacity, including the main circuit breaker integral to the generator shall be specified and mounted nearest to the engine control panel inside the protective housing for units 100 kW and greater and all units with Day Tanks. The GAP shall be factory hard wired to provide power circuits for the jacket water heater, battery charger and the 20-amp duplex receptacle which shall be also located on

the side of the engine control panel inside the generator housing. Provide two spare 15 ampere circuit breakers – (one for wiring the day tank controls and other for future use). Provide the remaining two slots in the generator panel as spaces for future use. Provide a 1-1/2" conduit from the designated Life Safety panel to provide power conductors for the GAP.

- j. Locate the generator exhaust as far away as possible from the building air intakes and/or any operable windows. The minimum separation distance shall be 25 feet. If not feasible to provide the minimum 25 feet, written approval is required from FMD and the Project Manager. The generator muffler shall be located inside the outdoor generator set enclosure.
- k. Specifications for 250 kW and larger shall require data from a factory reactive load bank test and a resistive load bank test. The Contractor shall conduct an on-site field load bank performance test with unity power factor in accordance with NFPA – 110 requirements for all new emergency generators. Final mechanical (Generator, Main Fuel Tank and Day Tank) inspections shall have been completed prior to initial start-up of the generator. Two days' notice shall be given to the Project Engineer to coordinate the initial start-up tests. Approval of preliminary electrical inspection shall be a pre-requisite for the start of performance and acceptance (Load Bank) tests. Load Bank Test shall be witnessed by the Project Manager (Construction Project Engineer or FMD Project Engineer). Two days' notice shall be given to the Project Manager (Construction Project Engineer and FMD Project Engineer) to coordinate the performance and acceptance tests. The performance test results shall be signed off by the Owner (Construction Project Engineer or FMD Project Engineer). The building loads shall be transferred to the generator system after the load bank tests have been accepted.
- l. All new or replacement generators shall have a non-fusible 3 position double throw disconnect and a connection box for a roll up generator, installed for units up to 1200 amperes. Generators rated greater than 1200 amperes shall be provided with a tap - box to facilitate the connection to a manual transfer switch.
- n. Provide a 24 (twenty four) light LED Remote Generator Annunciator Panel (RGAP) next to the Fire Alarm Control Panel (FACP) or an other location as determined by specific needs of the facility. A separate 1" conduit with 2 twin axial shielded cables (Beldon 9413) and twelve (12) #12 stranded copper conductors shall be provided from the generator control panel to the RGAP. The RGAP shall comply with the requirements of NFPA 110 with the following extra lights as optional on all projects (Additional lights may be added as necessitated):
 - Day Tank Trouble Alarm
 - Normal Power
 - Generator Running
 - Generator Fault (Trouble)

- Main Circuit Breaker “OFF” position
 - Green Light indicating “Panel Disarmed Temporarily”
 - Spare
 - Spare
- o. Provide a separate 1” conduit with 16- Cat 5 control wires from the Automatic Transfer Switch (ATS) to the Generator Engine Control Panel (GECP) for the purpose of providing start-stop controls and ATS position indication, other required controls, and future controls.
 - p. Provide a separate 1” conduit from the generator control panel for connecting the Day Tank control wires.
 - q. Provide a separate 1” conduit from the 60 amp GAP to the Day Tank for the power conductors.
 - r. Provide an RS Generator Alarm Panel.
 - s. The generator must be designed to run on ultra-low sulfur diesel fuel.
 - t. See Mechanical Division 15000 - 1.E.1 if fuel tank and fuel delivery system supply other onsite equipment in addition to the emergency generator.
 - u. The fuel tank shall be sized to provide emergency generator fuel for 96 hours. Coordinate with the FMD Project Manager to determine the required loads on the generator in each project. See Mechanical Division 15000 - 1.E.7. If space does not permit capacity for 96 hours, then provide a tank with capacity for 72 hours minimum.
 - v. Provide a Generator Connection Box per attached 16000 – Exhibit #2 with separate 1” conduits from each ATS and the Generator containing eight (8) #12 stranded copper control wires. Provide conduit and wiring for the two receptacles in the Generator Connection Box to be fed from the Life Safety and Standby panels respectively. Life Safety Panels shall be designated as EHLS & ELLS for 480 Volt Systems and ELS for 120 Volt Systems with corresponding Automatic Transfer Switches as EHLS and ELS respectively. For the Stand-by Panels the designation shall be EHSB & ELSB for 480 Volt Systems and ESB for 120 Volt Systems. Corresponding Automatic Transfer Switches for the standby panels shall be designated as EHSB and ELSB for 480 Volt and 120 Volt respectively.
 - w. The generator and automatic transfer switch shall be covered by the full one-year warranty for the project, in addition to more extensive warranties offered by the specified manufacturers for equipment and labor. The contractor shall respond within two hours for any generator failures or problems that occur during normal or after hour timeframes during the one-year contractor warranty period, including weekends and holidays.

- x. The Automatic Transfer Switch shall be complete with the isolation and bypass features to facilitate the equipment servicing without shutting off normal or emergency power to the facility.
- y. Final inspection of the Emergency generator and the fuel tanks (main and Day Tanks) and fuel piping associated with the emergency generator system shall be performed by the Fire Marshall's office and the County's mechanical and electrical inspectors after the start-up of the generator has been completed, all wiring has been installed, and prior to the performance of the load bank test. After the load bank test has been accepted, the building loads are to be transferred to the generator system. A generator schematic detail shall be provided indicating all conduit stub-ups emanating from the generator pad to the Three Position Switch, Generator Connection Box, any Equipment Rack, Day Tank and Electric Room similar to illustration shown as 16000 – Exhibit #3.
- z. O&M training for Emergency Standby Generators and Automatic Transfer Switches shall be conducted by a certified training instructor provided by the manufacturer and shall be performed on-site after the startup and acceptance tests of the generator have been completed.
- aa. Specialized maintenance servicing tools (diagnostic tool, laptop computers etc.) required for Emergency Standby Generators and Automatic Transfer Switches shall be provided by the installer and shall be transmitted to FMD.

D. Grounding and Bonding

- 1. Provide grounding as per NEC. Additional grounding rods may be required to achieve 5 ohms or less. A test well shall be provided for one of the main grounding grid rods and the location of the test shall be marked on the Site Plan.
- 2. A main grounding bar shall be installed inside the electrical room, and connected to the grounding rods, lightning protections system (where necessary), building steel, counterpoise and main water pipe. All secondary transformer neutrals shall be connected to this grounding bar.
- 3. Main service neutral shall be bonded at the service entrance disconnect and the grounding bar in accordance with NEC requirements.
- 4. A counterpoise or grounding grid around the entire generator is required as per 16000 – Exhibit #4. The generator and the Main Fuel Storage Tank and the Day Tank shall be grounded and this grounding grid shall be bonded with any other building grounding grid or the Lightning Protection System grounding.

5. Generator pad shall be minimum 12" above grade monolithic pad. Outside dimensions of the pad shall exceed that of the generator set a minimum of 12" on all sides with $\frac{3}{4}$ " chamfer.

E. Receptacles

1. GFCI and ARCH FAULT receptacle circuits shall not share neutral wires with normal circuits. Sharing of neutral wires should also be avoided on receptacles that may be used for any type of computer or equipment with a switch-mode power supply. Each circuit shall be provided with its own neutral wire.
2. Use of outdoor receptacles shall be minimized. Where provided, outdoor receptacles shall be designed to limit access to authorized personnel, only. Provide receptacles adjacent to exterior mechanical equipment for maintenance purposes per NEC requirements.

F. Fire Alarm System

1. The installer of the fire alarm and Fire Suppression Systems (see Section 15000) shall be required to provide four complete sets of Maintenance and Operation manuals, parts manuals, and list of local vendors for the system to the Owner at Substantial Completion.
2. The Contractor shall turn over fire alarm system keys, operations and maintenance manuals, and as-built drawings to Owner at or before Substantial Completion.
3. The Contractor shall provide as-built drawings prints, as-built schematic diagrams and wiring diagrams, keys to cabinets, panels, and manual stations and any access codes shall be provided to the Owner at Substantial Completion.
4. The contractor shall provide a system for which repair parts and service is readily available to the County from local vendors. The County shall not be bound to an exclusive vendor for repair, maintenance or material procurement for the system or its components.
5. Fire alarm devices vary widely in their electrical characteristics and must be carefully matched with suitable control panel to assure proper performance. Fire alarm devices, control panel and annunciator panel must be from the same manufacturer.
6. All fire alarm devices shall be readily accessible for testing, repair and maintenance purposes. All fire alarm devices located above a suspended ceiling must be clearly labeled as such on the ceiling. An LED light must be provided at the ceiling to show annunciation of that device, and access must be provided through the ceiling.
7. Smoke detectors shall not be located adjacent to or within three feet of supply or return air vents/diffusers.

8. Smoke detectors shall be provided in accordance with NFPA 72 and the applicable text and tables. Avoid specifying and locating smoke detectors in addition to that required by Code.
9. The contractor shall be required to provide the County with replacement initiation devices and audio-visual devices, equaling 10 percent of the total number of installed devices but not less than one of each type device, within seven days of Substantial Completion.
10. The specifications shall require that the contractor notify the Owner (Project Engineer to coordinate with FMD) at least 7 days in advance of the final complete test of the entire system to witness the testing prior to the acceptance by the County. Testing shall consist of, at a minimum: smoke and alarm, each smoke and duct detector, pull and reset, each pull station. Specifications shall require that the Contractor provide a complete overview of the system at the time of this system test.
11. The installer shall maintain the color-coding established by the manufacturer throughout the system. The terminations or connections in the control panels or junction points shall be clearly marked and the corresponding field wiring shall be permanently tagged.
12. Two dedicated telephone outlets are required for each auto-dialer. A jack shall be provided for each line to facilitate maintenance and testing.
13. Auto-dialer program and format codes shall be transmitted to Owner at the Substantial Completion walk-through, and a copy shall be included in the operations manual for the fire alarm system.
14. An auto-dialer shall be provided and connected to support the Fire Alarm Control Panel (FACP). The auto-dialer, which serves the FACP, shall not serve any other equipment.
15. The auto-dialer for the fire alarm shall be connected to the County's contracted monitoring service as directed by the Owner.
16. The auto-dialer, which serves the security system, shall not serve other equipment.
17. Facilities with an elevator shall be provided with an auto-dialer for the elevator, connected to the emergency phones in the elevator cabs and elevator lobbies. The auto-dialer shall connect to the County's contracted monitoring service as directed by the Owner.
18. The FACP, the Fire Alarm Annunciator Panel, and auto-dialer shall be programmed to automatically reset once a trouble or fault is cleared, as required by the Fairfax County Fire Marshall.

19. The auto-dialer for the Fire Alarm system and the elevator emergency phones shall have manual onsite reset capabilities, and shall automatically reset once the trouble or phone line or power interruption has cleared.
20. The auto-dialers shall automatically restore and or reset upon power or phone line interruption, once the power or the phone line restores and or stabilizes.
21. The auto-dialers shall be programmed to monitor/report events as required by the Fairfax County Fire Marshall's office. These events shall be sent via the dedicated phone lines to the County's contracted monitoring company as directed by the Owner.
22. The auto-dialer test timer test shall be programmed to perform between 7:00 A.M. and 1:00 P.M.
23. The contractor shall be required to arrange to receive and respond to all trouble and alarms received by the County's monitoring service prior to building occupancy by the County.
24. Duct detectors shall be programmed for Supervisory alarm as required by code.
25. Shelters and drug treatment facilities sleeping quarter's smoke detectors shall be programmed for Supervisory alarm as required by code.
26. The contractor shall transmit a copy of the Fire Marshall's final inspection report to the owner for transmittal to FMD prior to building occupancy by the County.
27. A key box is required by the Fire Marshall's office for the Fire and Rescue Department key access to buildings. See <http://www.fairfaxcounty.gov/fr/prevention/fmpublications/crp2009.pdf> Exhibit 08000A. The contractor shall coordinate with the Fire Marshall's office for the location and provide and install all required key boxes.
28. A/E shall obtain the most current copy of the Code Reference Package (CRP) for Architects, Engineers, Designers and Installers from the Fairfax County Fire & Rescue Department, Fire Prevention Division, Engineering Plans Review Section, and shall incorporate all requirements CRP into the design documents. All requirements of the CRP which are intended to be the responsibility of the Contractor shall be clearly identified as such in the contract documents.
29. Specifications shall clearly state that the Contractor is responsible for paying for all shop drawings, review fees, and permit fee associated with the review, approval and permitting necessary for a complete fire alarm system. The Contractor shall also pay any additional costs for Fire Marshall's inspections beyond those paid for by the Owner as part of the building permit and inspection fees.

30. All FACP auto-dialers shall have external surge suppression to protect the systems from lightning and voltage surges both from the line voltage and the phone lines. The surge suppression shall be in addition to the manufacturer's built-in suppression system. The surge suppression shall be installed and located adjacent to the FACP and the auto-dialer. A separate surge suppressor shall be installed for each of the FACP's and the auto-dialers.
31. Warranty for Fire Alarm Systems, shall be the system manufacturer's standard warranty (one year minimum), with options to purchase additional coverage.
32. Owner training (4 hours) for the Fire Alarm Systems shall be conducted by a certified training instructor provided by the manufacturer and shall be provided on-site after startup, and final Fire Marshall's inspections are completed and accepted.
33. Provide access panels to duct detectors for routine service and testing in a readily accessible and safely serviceable location. The access panel shall be located to allow for clear access with no obstructions such as, ducts, conduits, pipes or wires. The use of removable fixtures is not acceptable for access.
34. Fire Alarm System maintenance servicing tools (device programmer/diagnostic tool, interface devices etc.) shall be provided by the installer and shall be transmitted to the Owner for use in servicing, testing and maintaining the systems.
35. The contractor shall be responsible for all Fire Alarm System service and trouble calls on the equipment during normal and after normal work hours with a maximum response time of two hours, until the system is turned over and accepted by the Owner.
36. A plan of the fire alarm initiating devices and the corresponding device address shall be provided and installed adjacent to the FACP. These locations shall also be shown on the as-built floor plans for the fire alarm system. A copy of this plan shall be included in the Fire Alarm Systems O&M Manual.
37. Automatic HVAC shut down shall occur during fire alarm when alarm is initiated by automatic devices. HVAC shall not shut down if there is a manual trip of the alarm.
38. Provide interface wiring and conduit connection between fire alarm control panel and the remote generator alarm panel. Program Fire Alarm Control Panel to annunciate generator status alarms and have ability to connect into the County EDGAR system.
39. Fire alarm wiring protection for new critical operation facilities shall comply with NEC 708.14.

G. Lighting

1. Lighting shall be designed for the foot candle levels per the table listed in paragraph 16 below with task lighting provided to supplement where higher levels are desired. All fluorescent lights shall be provided with 32-watt T-8 lamps and electronic ballasts. Recommended light fixtures are: 2 x 4 lay-in with parabolic louvers, three lamps (277 volts). An acceptable alternate lighting fixture and source shall be LED lamps and fixtures. Outdoor LED fixtures shall have a color temperature of 5010°K, indoor 2750°K. Lumen output shall not occur by overdriving LED lamps to produce high Lumen ratings. Lighting loads shall comply with the requirements of the latest revision of International Energy Conservation Code. Electrical Energy Certification Form at http://www.fairfaxcounty.gov/dpwes/forms/elec_eng_comp.pdf. Exhibit 16000 A shall be completed and reviewed by the FMD Project Manager before submission to the County with Permit set submission.
2. Light fixtures used as HVAC diffusers are not acceptable.
3. Lighting in atrium areas, libraries or other high ceiling areas should utilize HID, Induction, or LED fixtures with remote drivers located in a-properly vented area. Ready access to all light fixtures is essential to properly maintain the designed lighting levels. Fixtures in high ceiling areas such as libraries shall be accessible from a ten-foot stepladder. Fixtures should be laid out so that it does not require the use of specialized personnel lifts with articulating booms or build up scaffolding. Fixtures that are not readily accessible are not acceptable.
4. The use of incandescent fixtures is prohibited except when specifically approved by the County FMD Project Manager. Where practical, lamps should be a common stock item standardized so that bulbs need not be special ordered.
5. Dimming systems shall be compatible with the BAS in place and also communicate with existing systems in the facility. All new or replacement dimming systems must receive prior approval by FMD. Automatic dimming systems should be utilized in areas where "daylight" may provide all or most of the required light level. Coordinate with FMD County Project Manager for prior approval of any proposed dimming system when using energy conserving lighting systems.
6. Decorative, accent and neon lighting should not be used, without specific approval from County Project Manager and FMD.
7. All exterior lighting should be controlled by photocell controls. The lighting controls, clocks and photocell controls should be located in the main electrical room. Parking lot lighting may be provided and maintained by the local utility. Coordinate with the County Project Manager prior to selection. Outdoor walkway lighting will be provided and maintained by the Owner and included as part of the design documents. Bollard type fixtures should not be used because they are a constant maintenance

liability due to vandalism. The use of outdoor, in-ground lighting is discouraged due to vandalism. Plans must show Contractor provided conduit for all site lighting circuits. The use of UF cabling for exterior lighting is not acceptable. All circuits for exterior lighting shall be routed in conduit.

8. Provide a small mulch bed installed around in ground light fixtures such as flag poles or building sign lights such that a lawn mover will not come into contact with the fixture head.
9. The mechanical and the electrical room lighting shall be on the standby emergency generator.
10. Where appropriate, the fuel site lighting and the power shall be on the emergency generator.
11. Lighting fixtures with battery backup, fluorescent or LED back up are not acceptable. Where buildings are served by Emergency Generators battery backup lights shall not be permitted. Facilities not served by Emergency or Standby Generators shall be provided with dual head battery pack flood type fixtures for ease of maintenance.
12. In libraries where stack lighting is accepted for use by Owner to be used, locate the lights where they are accessible for maintenance or repairs.
13. Where low voltage controls are incorporated for local switching, a layout of the relays should be permanently placed in the facility's main electrical room and panels and circuits should be clearly identified.
14. Separate emergency lighting control panels for the emergency lighting circuits shall be provided. These panels shall be painted red for easy identification and maintenance.
15. Fire station hose towers should be properly illuminated for safe use for storage. The fixtures shall be water tight and accessible for repairs.
16. Day lighting or indoor electrical illumination should comply with ANSI/IESNA RP-1-04. These values may need to be modified to suit the specific application in each facility.
 - a. Corridors 5 foot candles
 - b. Lobbies 10 foot candles
 - c. Means of Egress 20 foot candles
 - d. Storage Area 10 foot candles
 - e. Waiting Rooms & Lounge Areas 10 foot candles
 - f. General Office Areas 50 foot candles
 - g. Desktops 50 foot candles
 - h. Conference Tables 30 foot candles

- | | |
|----------------------|-----------------|
| i. Secretarial Desks | 50 foot candles |
| j. Filing Cabinets | 50 foot candles |
| k. Book Shelves | 50 foot candles |
| l. Drafting | 30 foot candles |

Public Spaces:

- | | |
|----------------------------|--|
| m. Library Reference Areas | 50 foot candles |
| n. Library Reading Areas | 50 foot candles |
| o. Auditoriums | 30 foot candles |
| p. Cafeterias | 30 foot candles |
| q. Parking Structures | 1-5 foot candles (depending on level of use and security. Review with the County Project Manager.) |

17. Lighting in high bay areas such as garages, gymnasiums or warehouses should use pendant type Induction, HID, or LED fixtures and should be easily removable for repair or replacement. Cord and plug connected is preferred. Safety chains must be provided on each fixture. Where Emergency Generators supply the power provide LED fixtures for instantaneous illumination in accordance with Life Safety Code requirements for emergency egress
18. The A/E shall coordinate with the County Project Manager prior to selection of the site lighting. The site lighting may be provided and installed by the general contractor using Fairfax County approved site lights or by Dominion Virginia Power (DVP) under DVP and NOVEC Municipal Street Lighting contract. Subject to advance approval by the Owner, Contractor installed Induction or Light Emitting Diode (LED) site lighting fixtures may be specified, however, LED lights are preferred. See Products section for more details. The lights are to be used on small to medium size parking lots where cobra-head type fixtures are not appropriate and appropriate types and sizes of fixtures may not be available thru DVP.
19. Occupancy Sensors shall be installed in areas of non-continuous lighting requirements, such as parking garages (dependent on security requirements), warehouses, conference rooms, offices, rest rooms, data centers, cafeterias, etc.
20. Provide occupancy sensors in parking garages and parking lots where time clock off feature is used for general occupancy.
21. In facilities that do not operate 24/7, the lighting levels must be reduced after the facility closing hours, to meet the Fairfax County Zoning Ordinance Performance Standards, required for parking lots and top deck of parking structures. The A/E shall specify photocell and appropriate equipment to comply with the Zoning Ordinance.
22. All site and open garage lighting shall be provided with full cut-off to limit lighting to the property lines. Exterior lighting fixtures shall have glass lenses, plastic acrylic are

not acceptable as these degrade the light output by becoming yellow and are a maintenance burden.

23. Exterior building and walkway lighting not installed and maintained by DVP must be durable and vandal resistant. Metal bollard fixtures are not acceptable.
24. All wall mounted lighting control switches (and other similar wall mounted control switches) shall be toggle type switches. Rocker type switches for energy saving lighting control systems is acceptable.
25. Provide occupancy sensors to automatically shut off lights for offices, conference rooms, storage rooms, gymnasiums, and other appropriate spaces. Coordinate with the owner/occupier for specific rooms in a given building. The occupancy sensor must be located in an appropriate location for optimum operation.
26. Emergency Exit lights shall be LED type.
27. Track lights, Mono, Twin Rail, Low Voltage Decorative lights are a high maintenance item and should be avoided and provided only if absolutely necessary.
28. Remote ballasts should be grouped in a space with sufficient size and ventilation to support the equipment and shall be readily accessible for maintenance purposes. Remote Ballasts located above ceilings requiring ladder access are not considered readily accessible.
29. Provide interface and connect lighting control panels to BAS. BAS shall provide master programming for lighting controls.

H. Lightning Protection Integrated with the Main Grounding System

1. Lightning protection system is not a requirement for every facility. A risk analysis shall be conducted per NFPA 780 to verify the level of risk. The results of this analysis shall be provided to the Owner in the design narrative. The decision to include the lightning protection system shall be made based on the risk level and cost.
2. Direct contractor to submit detailed as-built drawings for the lightning protection system with UL certification. As-built drawings must show down-lead locations, conductor routing and conductor connections sites. A copy of the UL Master Label certification of the lightning protection system must be included in the O&M manuals. Provide a bond for the lightning protection system with the main grounding grid or main grounding bar.
3. Require contractor to also provide as-built drawings for the building grounding system including rod sizes, locations, and configuration and connection details.

4. Specifications shall require that the contractor obtain a UL certification for the grounding system and submit a copy of the certificate to the Architect/Engineer and FMD for review and approval before final submission to the Owner.

I. Telecommunications Guidelines:

1. Refer to Appendix B.

II. PRODUCTS

A. Electrical Main Services

1. Main distribution panels, sub panels and disconnects shall be Cutler Hammer, Square D or Siemens. FPE and Challenger are not acceptable. Cutler Hammer CH- PRL1a panels are preferred with bolt in breakers. The type PB panels give flexibility by accepting both bolt-in and push-in breakers. Provide one stock circuit breaker for each type installed.
2. The use of aluminum cable is unacceptable. Provide only copper cable. All branch circuits and feeder conductors #6 and larger shall have manufacturer applied phasing color for full length. (SIM PULL by South Wire manufacturer as a reference). Use of phase colored tape is not acceptable.
3. Motor Control Centers: Square D, General Electric, or Siemens. The use of motor control centers shall be approved in writing by FMD and Project Manager.

B. Wiring Systems

1. Where a floor wiring system is required, a walker duct type floor system with separate trough for electrical, computer and communication wiring is recommended. Flat wire systems are not desirable and shall not be included in the design without prior approval of the County Project Manager (flat wiring must be approved in writing by the Telecommunications Division of the Department of Information Technology).

C. Emergency & Standby Generator and Automatic Transfer Switch Set

1. The acceptable manufacturers for emergency standby generators are: MTU Onsite Energy, Generac, Cummins and Caterpillar.
2. The use of a Detroit V-12 engine is not acceptable.
3. Automatic transfer switch manufacturers shall be Zenith, ASCO, Cummins (no equal products).

4. All new transfer switches shall be isolation and bypass type to facilitate easier maintenance and online reliability.

D. Fire Alarm System

1. Manufacturers for fire alarm devices, control panels, and annunciator shall be Silent Knight 5820 XL or other non proprietary system. Only listed graphic fire alarm annunciator panels (IEC; NFPA 72A 1-2.2) are to be installed. All fire alarm devices connected to the Fire Annunciator Control Panel (FACP) shall be by the manufacturer of the FACP.

E. Site Lighting

1. Metal Halide Lights, Induction, or LED lamp (Verify with the FMD County Project Manager for most current models)
 - a. Manufacturer: Holophane (www.holophane.com)
 - b. Model: Mongoose,
<http://www.holophane.com/products/Family.asp?Brand=HLP&Family=Mongoose&ProductType=Outdoor&Category=designer&SubCategory=Contemporary> Or www.Holophane.com/products (look for Contemporary, select Mongoose).
 - c. Lamp Type: 175 Watts Metal Halide, medium base
 - d. Mounting: 20' square steel posts in parking lot, 14' poles immediately adjacent to the building.
 - e. Pole and Fixture color: Squat steel pole, grey pole and fixture
 - f. Voltage: 277
2. LED Lights (Verify with the FMD County Project Manager for most current manufacturers and models)
 - a. Manufacturer: Elumen (www.elumen.ca)
 - b. Model: LED-SL-100WX-A-W-3-22-5, ARM 7",
http://www.elumen.ca/index.php?option=com_content&view=article&id=11&Itemid=38&lang=en
 - c. Lamp Type: LED, Medium base
 - d. Mounting Height: 20' at parking lot, direct mounted.
 - e. Poles: SA-20-400-C3AB-IDR series.
 - f. Pole and Fixture color: Squat steel pole, grey pole and fixture
 - g. Voltage: 277
3. LED Lights-Decorative (Verify with the FMD County Project Manager for most current models)
 - a. Manufacturer: Holophane (www.holophane.com)
 - b. Model: WFL/Washington Postlite
 - c. Lamp Type: 100 W LED

- d. Mounting Height: 20' Base Mounted.
- e. Pole and Fixture color: Black
- f. Voltage: 120 Volts
- g. Optics Specified: Asymmetric full cutoff flat glass
- h. Ball Finial

PANEL:

VOLTAGE: 208/120V ▼ 3 PHASE, 4 WIRE

LOCATION:

AIC: 22,000 ▼

MOUNTING: SURFACE ▼

SOURCE: NORMAL ▼

FED FROM:

MOUNTING: SURFACE ▼

SOURCE: NORMAL ▼

SECTION: 1 OF 1

LOAD TYPE	LOAD DESCRIPTION	FDR SIZE (KVA)	BKR (A)	CKT NO	LOAD (KVA)			CKT NO	BKR (A)	LOAD (KVA)	FDR SIZE	LOAD TYPE
					PHASE A	PHASE B	PHASE C					
N				1	0.0			2				N
N				3		0.0		4				N
N				5			0.0	6				N
N				7	0.0			8				N
N				9		0.0		10				N
N				11			0.0	12				N
N				13	0.0			14				N
N				15		0.0		16				N
N				17			0.0	18				N
N				19	0.0			20				N
N				21		0.0		22				N
N				23			0.0	24				N
N				25	0.0			26				N
N				27		0.0		28				N
N				29			0.0	30				N
N				31	0.0			32				N
N				33		0.0		34				N
N				35			0.0	36				N
N				37	0.0			38				N
N				39		0.0		40				N
N				41			0.0	42				N

Notes:

- 1.
- 2.
- 3.

KVA/PHASE 0.0 0.0 0.0

(KVA) (AMP)

TOTAL CONNECTED: 0.0 0 0

PANELBOARD SPECIAL FEATURES

☐ SURGE PROTECTION DEVICE (SPD)
☐ OTHER

LOAD TYPE CODE LETTERS

(KVA) (AMP)

C	CONTINUOUS LOAD (125% OF CONTINUOUS LOAD)	0.0	0
K8	KITCHEN DEVICES (SIX OR MORE AT 65% OF LOAD)	0.0	0
LM	LARGE MOTOR LOAD (LARGEST MOTOR x125%)	0.0	0
M	MOTOR LOAD (100% OF LOAD)	0.0	0
IM	INTERMITTENT MOTOR LOAD (85% OF LOAD)*	0.0	0
N	NON-CONTINUOUS LOAD (100% OF LOAD)**	0.0	0
R	RECEPTACLE LOAD (FIRST 10KVA AT 100%. REMAIN. AT 50%)	0.0	0
TOTAL DEMAND:		0.0	0

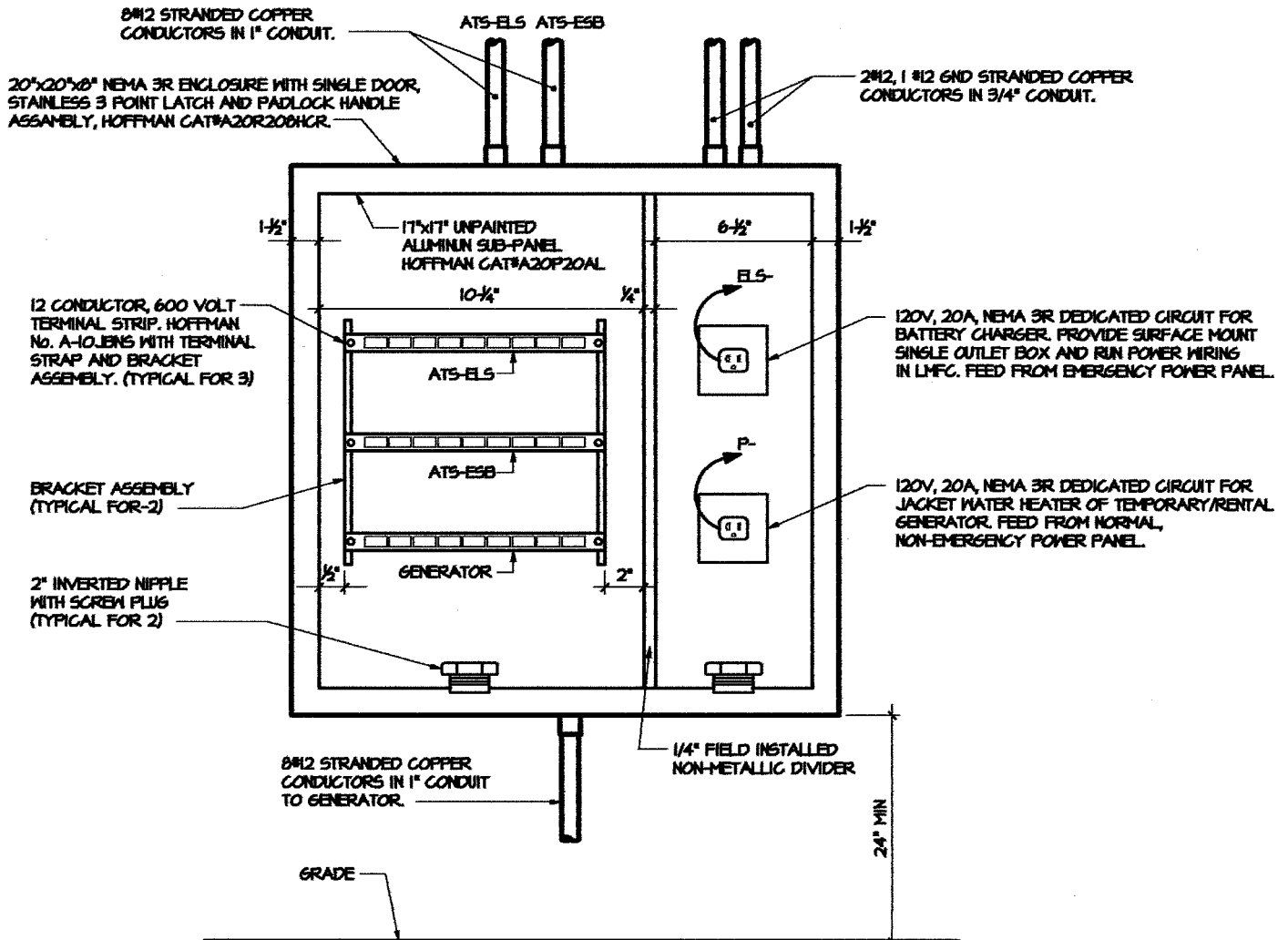
* FAIRFAX COUNTY @ (100% OF LOAD)

** REMAINING LOADS

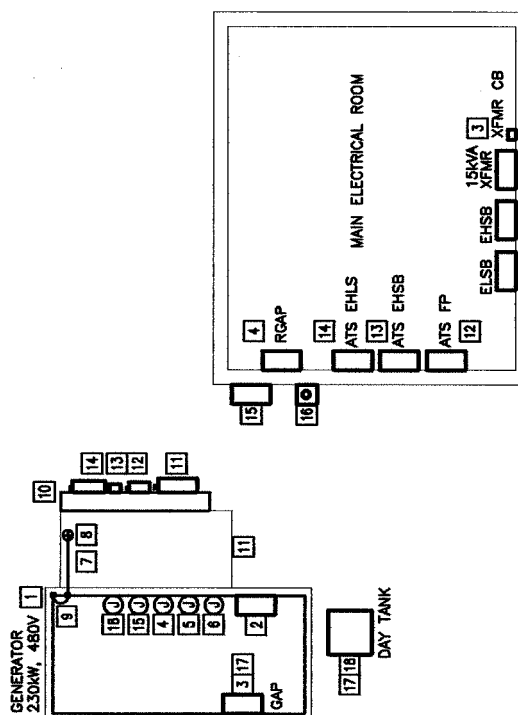
FEEDER SIZE:

1
2
3
4
5
6
7
R
X
E

 RELOCATE EXISTING CIRCUIT
 REMOVE EXISTING CIRCUIT (CONDUIT AND WIRE)
 EXISTING CIRCUIT TO REMAIN

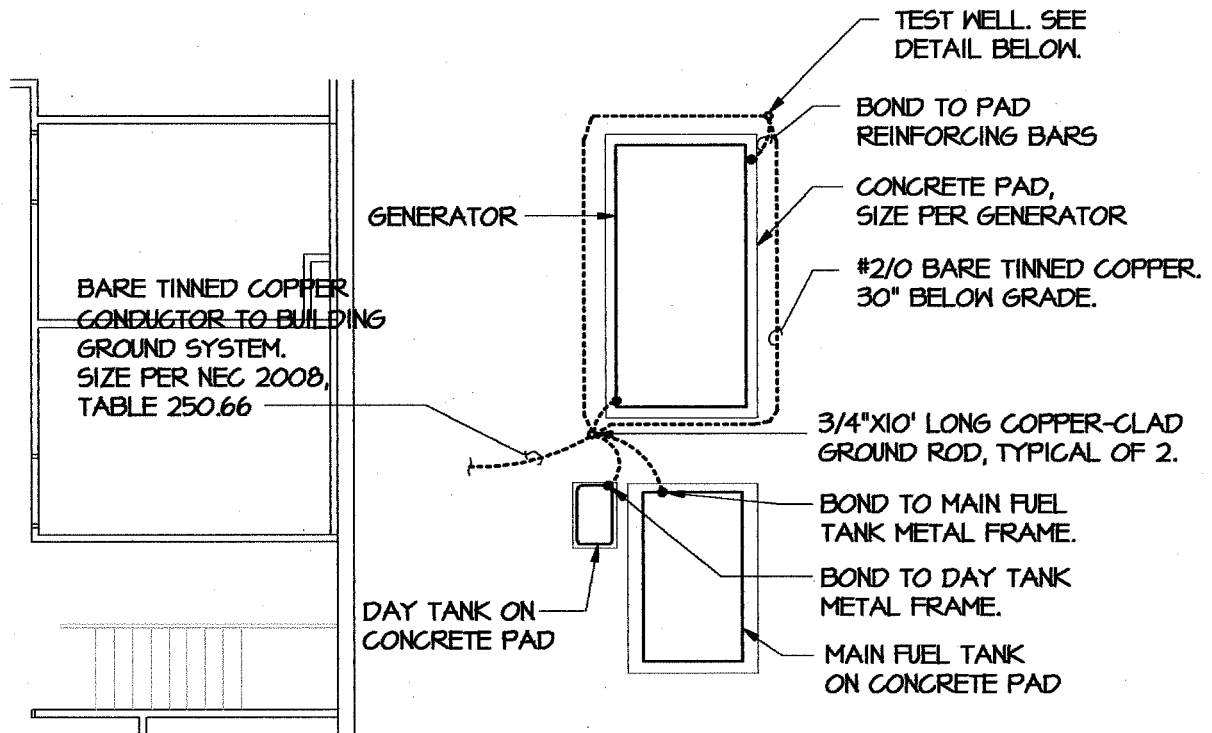


GENERATOR CONNECTION BOX
NOT TO SCALE



- 1 COORDINATE STUB-UP AND EQUIPMENT CONNECTION LOCATION FOR ALL UNDERGROUND FEEDERS WITH GENERATOR MANUFACTURER PRIOR TO ROUGH-IN. RUN CONDUITS ALL 24" BELOW FINISHED GRADE.
- 2 CONNECT POWER CONDUCTORS TO GENERATOR MAIN CIRCUIT BREAKER FROM RACK MOUNTED 3PDT DISCONNECT SWITCH WITH INVERTED NIPPLES. SEE RISER DIAGRAM FOR CONTINUATION, CONDUIT AND WIRE SIZES.
- 3 1" CONDUIT FROM GENERATOR GAP PANEL TO 15KVA XFMR VIA ENCLOSED CB.
- 4 EXTEND 1" CONDUIT WITH 12#12 AND 20/TRS TWISTED PAIR ('BELDEN' #9413) FROM CONTROL PANEL TO REMOTE GENERATOR ANNUNCIATOR PANEL (RGAP).
- 5 1" CONDUIT WITH CONDUCTORS TO EXTERIOR WALL MOUNTED GENERATOR CONNECTION BOX AS REQUIRED TO PARALLEL GENERATOR REMOTE START AND STOP CONTROLS AT ATS-GEN. PROVIDE SCREW DOWN WIRING STRIP IN ENCLOSURE FOR PARALLEL CONNECTION OF ROLL-UP GENERATOR CONTROL WIRING.
- 6 4#20 IN 3/4"C FROM GENERATOR CONTROL PANEL TO DAY TANK FOR CONTROL.
- 7 4#/0 AWG BTC GROUND CONDUCTOR TO GROUND ROD. CADWELD CONDUCTORS TO GENERATOR FRAME AND GROUND ROD.
- 8 10' BY 3/4" STEEL COPPER CLAD GROUND BAR DRIVEN 36" BELOW GRADE AND CONNECTED TO GROUND ROD CONDUCTOR.
- 9 20"-1/0 BTC UPPER GROUND GENERATOR TRANSFORMER FOUNDATION FOOTING.
- 10 EQUIPMENT RACK. SEE 4/E5 FOR DETAILS.
- 11 4#500+1#3G IN 3" C FROM GENERATOR TO DOUBLE THROW, CENTER OFF SWITCH.
- 12 3#6+1#10G IN 1" C FROM 200A FSS TO 'ATS-FP'.
- 13 4#1+1#6G IN 2" C FROM 100A FSS TO 'ATS-EHSB'.
- 14 1" EXTEND 4#250+1#4G IN 3" C FROM 400A FSS TO 'ATS-EHLS'.
- 15 1" CONDUIT WITH CONDUCTORS TO EXTERIOR WALL MOUNTED GENERATOR CONNECTION BOX AS REQUIRED TO PARALLEL GENERATOR REMOTE START AND STOP CONTROLS AT ATS-GEN. PROVIDE SCREW DOWN WIRING STRIP IN ENCLOSURE FOR PARALLEL CONNECTION OF ROLL-UP GENERATOR CONTROL WIRING.
- 16 WALL MOUNTED REMOTE MANUAL STOP STATION WIRED TO GENERATOR CONTROL PANEL TO PROVIDE EMERGENCY SHUT DOWN OF THE GENERATOR.
- 17 2#12+1#12G IN 1"C FROM GAP TO DAY TANK
- 18 2#12 IN 1"C FROM GENERATOR CONTROL PANEL TO DAY TANK

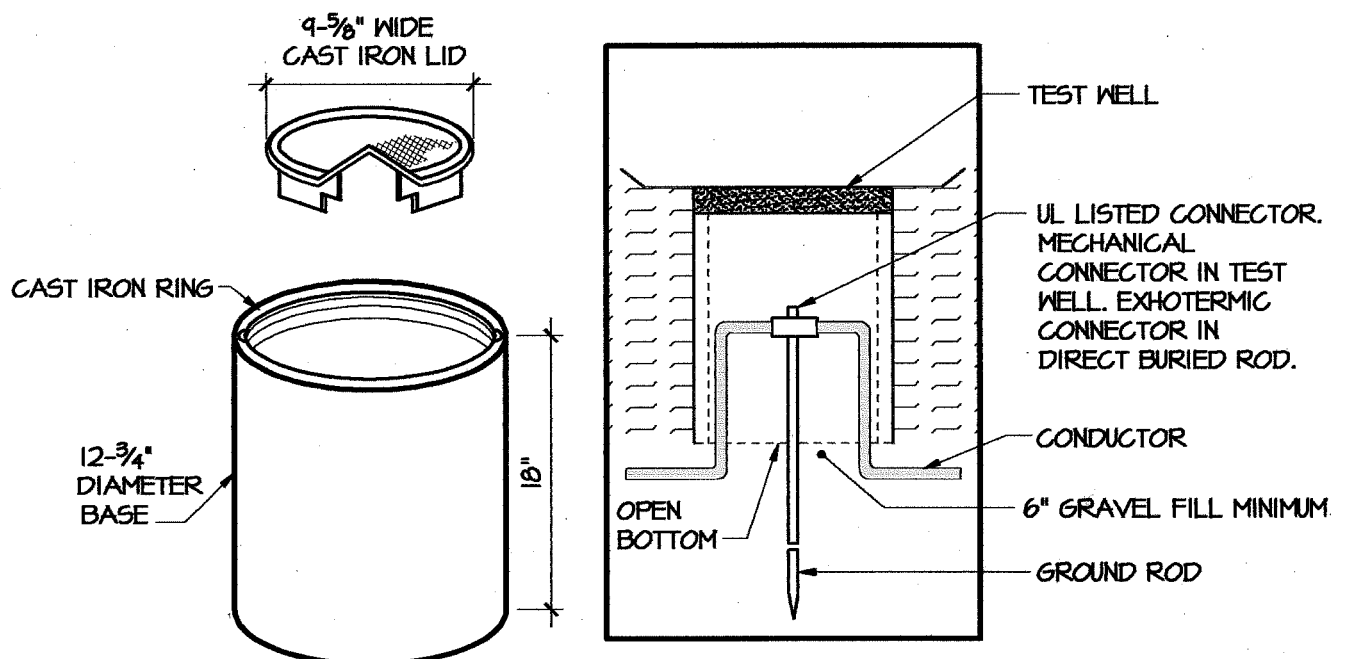
EX X GENERATOR SCHEMATIC DETAIL
EX NOT TO SCALE



GENERATOR GROUNDING DETAIL

NOT TO SCALE

NOTE: ALL EQUIPMENTS SHALL BE GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE 2008 EDITION ARTICLE 250, GROUNDING AND BONDING.



3/8" STEEL GROUND TEST WELL DETAIL

NTS

Appendix A

Green Building Design Guidelines (Under Development)

Guidelines for Architects and Engineers
February 2015

Appendix B

Telecommunication Systems Guidelines

Table of Contents

- 1. Guidelines For Voice and Data Communications Systems**
 - 1.1. General
 - 1.2. Standards And References
 - 1.3. Procedures

- 2. Guidelines For Cabling, Blocks, Patch Panels and Jack Types**
 - 2.1. County Standard Systems
 - 2.2. Standard Numbering Plan for Cabling Systems – EIA/TIA 606

- 3. Guidelines For Telecommunications Equipment Rooms**
 - 3.1. Telecommunications Room Requirements
 - 3.2. Conduit and Jack Requirements
 - 3.3. Telecommunications Equipment layout
 - 3.4. Ground buss bar details

1. Guidelines for Communications Voice and Data Systems

1.1 General

- a. The following guidelines have been established for contractors to be able to cable Fairfax County Government buildings. The standardization of station cabling will enable the County to have a flexible voice and data cable plant and provide vendors the ability to wire both voice and data for the future. Voice and data backbone/feeder cabling will continue to be specified on a case-by-case basis.
- b. With the evolution of the EIA/TIA-568B Commercial Building Telecommunications Wiring Standard came changes in the way the industry refers to different elements of a cabling system. Fairfax County will follow these standards in all of our existing and future facilities.

1.2 Standards and References

All building wiring, pathways and space grounding and bonding shall meet or exceed the following codes, standards, and references current as of the time of the project design.

- TIA/EIA-568-B.1 Commercial Building Telecommunications Cabling Standard Part 1: General Requirements – (May 2001)
- TIA/EIA-568-B.1-1 Commercial Building Telecommunications Cabling Standard Part 1: General Requirements - Addendum 1 – Minimum 4-Pair UTP and ScTP Patch Cable Bend Radius - (May 2001)
- TIA/EIA-568-B.1-2 Commercial Building Telecommunications Cabling Standard Part 1: General Requirements Addendum 2 – Grounding and Bonding Requirements for Screened Balanced Twisted-Pair Horizontal Cabling - (February 2003)
- TIA/EIA-568-B.1-3 Commercial Building Telecommunications Cabling Standard Part 1: General Requirements Addendum 3 – Supportable Distances and Channel Attenuation for Optical Fiber Applications by Fiber Type - (February 2003)
- TIA/EIA-568-B.1-4 Commercial Building Telecommunications Cabling Standard Part 1: General Requirements > Addendum 4 – Recognition of Category 6 and 850 nm Laser Optimized 50/125 μ m Multimode Optical Fiber Cabling - (February 2003)
- TIA/EIA-568-B.1-5 Commercial Building Telecommunications Cabling Standard Part 1: General Requirements Addendum 5 – Telecommunications Cabling for Telecommunications Enclosures – (March 2004)
- TIA/EIA-568-B.1-7 Commercial Building Telecommunications Cabling Standard Part 1: General Requirements Addendum 7 - Guidelines for Maintaining Polarity Using Array Connectors – (January 2006)

- TIA/EIA-568-B.2 Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted-Pair Cabling Components - (December 2003)
- TIA/EIA-568-B.2-1 Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted-Pair Cabling Components – Addendum 1 – Transmission Performance Specifications for 4-Pair 100 ohm Category 6 Cabling - (June 2002)
- TIA/EIA-568-B.2-2 Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted-Pair Cabling Components – Addendum 2 – Revision of Sub-clauses - (December 2001)
- TIA/EIA-568-B.2-3 Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted-Pair Cabling Components – Addendum 3 – Additional Considerations for Insertion Loss & Return Loss Pass/Fail Determination - (March 2002)
- TIA/EIA-568-B.2-4 Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted-Pair Cabling Components – Addendum 4 – Solderless Connection Reliability Requirements for Copper Connecting Hardware - (June 2002)
- TIA/EIA-568-B.2-5 Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted-Pair Cabling Components – Addendum 5 – Corrections to TIA/EIA-568-B.2 – (January 2003)
- TIA/EIA-568-B.2-6 Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted-Pair Cabling Components – Addendum 6 – Category 6 Related Component Test Procedures – (December 2003)
- TIA/EIA-568-B.2-11 Commercial Building Telecommunications Cabling Standard Part 2: Balanced Twisted-Pair Cabling Components – Addendum 11 - Specification of 4-Pair UTP and SCTP Cabling – (December 2005)
- TIA/EIA-568-3 Optical Fiber Cabling Components Standard - (April 2002)
- TIA/EIA-568-3.1 Optical Fiber Cabling Components Standard – Addendum 1 – Additional Transmission Performance Specifications for 50/125 μm Optical Fiber Cables – (April 2002)
- TIA-569-B Commercial Building Standard for Telecommunications Pathways and Spaces - (October 2004)
- TIA-570-B Residential Telecommunications Infrastructure Standard - (April 2004)
- TIA-598-C Optical Fiber Cable Color Coding - (January 2005)
- TIA/EIA-606-A Administration Standard for Commercial Telecommunications Infrastructure - (May 2002)

- J-STD-607-A Commercial Building Grounding (Earthling) and Bonding Requirements for Telecommunications - (October 2002)
- TIA-758-A Customer-owned Outside Plant Telecommunications Infrastructure Standard – August 2004
- TIA-526-7 Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant – OFSTP-7 - (February 2002)
- TIA-526-14-A Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant – OFSTP-14 - (August 1998)
- ANSI/EIA/TIA Telecommunications Infrastructure Standards is available from:
 - Electronic Industries Association Engineering Department 2000
Pennsylvania Avenue, N.W. Washington, DC 20006 (202) 457-4966

1.3 Procedures

1. In most new County buildings, CAT-6 or better UTP cabling system is required, as specified in the attached guidelines. Where there are minimal or no potential future data requirements (e.g., courtesy/emergency phones, recreation centers, etc.), all Category 3 or a combination of Category 3 and 5E or better cabling will be used. The Voice Communications Services Branch will specifically identify those situations when a vendor order is placed. Existing County facilities shall be cabled per the attached guidelines, unless there is a specific, pre-approved reason for deviation from guidelines.
2. The Infrastructure Project Manager will send notification to County cabling vendors, specifying that they must adhere to the attached guidelines, unless given specific instructions otherwise.
3. The assigned Infrastructure Project Manager is responsible for ensuring vendor compliance with these guidelines.

2. Guidelines for Cabling, Blocks, Patch Panels and Jack Types

2.1 County Standard Systems

1. Station Jacks Standard
 - a. CAT 6 Siemon 1-CT-6-A4-A4-02 Dual Jacks with a white icon for voice and a red icon for data, 568B 8-pin, RJ45's.
 - b. CAT 6 Siemon 1-CT-6-A4-A4-02 Dual Jacks with white icon for voice and a red icon for data, 568B 8-pin, RJ45's to be used upon request only.
2. Station Cabling Standard
 - a. Data – Mohawk MegaLAN 400 CAT 6 24 AWG 4PR (blue in color). All cables should be plenum rated.
 - b. Voice – Mohawk CAT 6, 24 AWG 4PR, Yellow in color and plenum rated.
3. Connecting Blocks Standard
 - a. 110 Type CAT 6 Siemon # 100PR Voice Termination 110 Type CAT 6 Siemon # 300PR
 - b. 110 Type CAT 6 Siemon # 100PR Data Termination
 - c. 110 Type CAT 6 Siemon # 300PR
 - d. 66 Type CAT 6 Siemon # S66M1-50 Data Termination
 - e. 66 Type CAT 6 Siemon # S66M1-50 Voice Termination
4. Patch Panels Standard
 - a. Siemon CAT 6 24-port-Blank #CT-PNL-24 48-port-Blank #CT-PNL-48 Inserts – Dual RJ45 #CTS-A4-A4-02 (red icons for data).
5. Patch Cords Standard
 - a. RJ45 to RJ45 8-pin-to-8-pin 568B CAT 6 (voice patch cables to be yellow in color)
 - b. RJ45 to RJ45 8-pin to 8-pin 568B CAT 6 (data patch cables to be grey in color).
6. Racks Standard
 - a. All new/future facilities
 - b. Cable Talk rack 84" by 19" rack with minimum 5" cable management on both sides, electrical power strip and top panels
7. Under Floor Duct Systems
 - a. Under Floor Duct Systems BICSI Telecommunications Distribution Methods Manual Volume I.
8. Raised Floors
 - a. Twenty four inch raised floor BICSI Telecommunications Distribution Methods Manual Volume I

2.2 Standard Numbering Plan For Cabling Systems – EIA/TIA 606

1. All vendors working on County IT projects shall maintain Fairfax County's Numbering Plan for wiring. Station cables shall be labeled by the communications room that they pull to, then by sequential numbering. For example, TC01-001 is station cable 001 connected to telephone room 01. The station end shall terminate in a dual jack with a white icon insert for voice and a red icon insert for data. The telephone room end shall terminate in wall-mounted blocks (AT&T 110 or Siemon 66 type) for voice cable, and directly to the CAT 6 patch panel for data cable.
2. Workstation cable runs cannot exceed 290 feet from the Telecommunications Equipment room. County buildings that exceed 290 feet from station set to the Telecommunications Room will require more than one Telecommunications Equipment Room.
3. All cables, circuits and facilities shall be clearly identified and labeled at all County sites. Cable shall be labeled at terminating points by use of durable self-laminating wire and cable markers. Patch panels, station jacks, terminal plates, etc., shall have typed labels. The AT&T 110/66 Siemon blocks shall be equipped with designation strips, which will be used to mark county cable and identify use. At the station jack, a label shall be placed at each cable, inside the outlet box, and on the jack faceplate.

3. Guidelines for Telecommunications Equipment Rooms

3.1. Telecommunications Room Requirements

1. Telecommunications Equipment rooms for telephone, data, video (CATV), etc., must be separate from electrical rooms.
2. No transformers or electrical distribution panels are permitted in Telecommunications Equipment rooms.
3. All Telecommunications Equipment rooms shall be provided with HVAC systems capable of maintaining the temperature of the room between 64 and 75 degrees F with the humidity being kept between 35 and 55 percent non-condensing. Separate split system units are acceptable.
4. Design door to open out of Telecommunications Equipment room.
5. Provide anti-static VCT flooring in the room.
6. A 12-inch buss bar with a number 6-ground wire to run from the buss bar to the main building ground in accordance with the NEC. See attachment for buss bar detail.
7. A minimum of one Telecommunications Equipment room must be provided at each floor of a facility with additional rooms as required to accommodate the communications equipment and wiring requirements. Workstation cable runs cannot exceed 290 feet from the patch panel to the jack.
8. All Telecommunications Equipment rooms, switch rooms, equipment, materials, wiring and ancillary provisions shall be designed and constructed in accordance with all requirements and recommendations of the Electronic Industries Association/ Telecommunications Industries Association (EIA/TIA) Standards. Requirement for compliance with this document must be reflected on project plans and specifications.
9. Telecommunications Equipment rooms must be of adequate size to accommodate requirements for County telephone, data and CATV, but in no instance shall they be smaller than 10' X 12'.
10. All four walls shall be covered with 4'x 8'x 3/4" fire retardant plywood for County telephone, data and cable television equipment. Plywood have two coats of white paint and installed from floor to ceiling. (8ft x 4ft.). Additional backboards may be required for VERIZON or CATV equipment.
 - a. A minimum of four (4) separately fused, 3-wire, 110 volt, dedicated quad electrical outlets one on each wall twelve inches above finished floor as shown on the typical floor plan. Four dedicated quad outlets mounted at 90 inches above finish floor. The DIT project manager must be consulted for the exact location of these outlets. The four outlets at 90 inches must be connected to generator power.

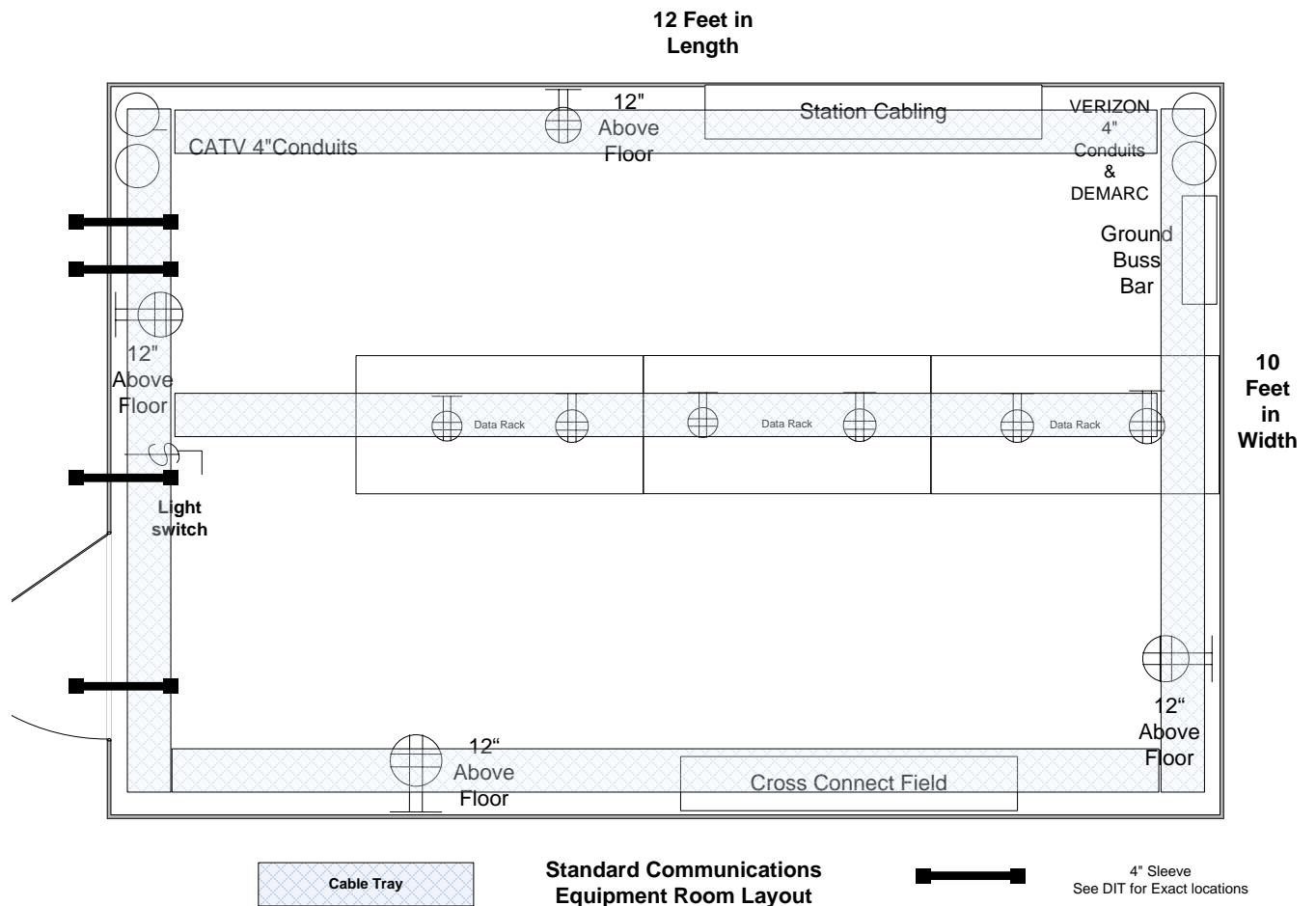
- b. Two ceiling mounted, tube fluorescent light fixtures with cover guard and a separate wall mounted switch to provide a minimum of 50 foot candles at 3' above finish floor and connected to emergency power.
- c. Adequate floor space for two (3) 30" wide by 26" deep by 84" high Cable Talk racks. (NFPA states 3 feet of clearance around active equipment).
- d. A minimum of three feet clear space on all sides of electrical/communications equipment per National Electric Code (NEC).
- e. Additional provisions may be required for other communications systems. See the DIT project manager for details

3.2. Conduit and Jack Requirements

- 1. A one inch conduit with drawstring must be provided to each communication device location and stubbed towards the Telecommunications Room. The 1" conduit must be stubbed to the nearest drop ceiling area. Cable trays may be required based on the overall density of the voice and data cabling. Only metallic conduit or PVC (schedule 40) smooth conduit are allowed. Systems Furniture cable trays, J-Hooks, etc.
- 2. Co-located voice and data communications cables may utilize the same 1" conduit into a single gang box.
- 3. Inaccessible or secure areas must have an entire conduit system from communication jack to the Telecommunications Equipment room.
- 4. Empty conduits and boxes in concrete slabs or an under slab duct /conduit distribution system, are required for systems furniture and/or freestanding furniture requiring communications outlets, as determined by the project scope.
- 5. A minimum of two four-inch empty conduits with mule tape (with footages) must be provided vertically and horizontally between all communications rooms that are wired in a series. The number, location and routing of these conduits are to be approved by the DIT Project Manager prior to construction.
- 6. A minimum of two four-inch conduits must be provided from the main Telecommunications Equipment room to the Quazite pull boxes located near the property line where the telephone service is located. Each conduit must have mule tape with footage markings. See typical floor plan for location of these conduits.
- 7. A minimum two, four-inch o must be provided from main Telecommunications Equipment room to extend to the pull boxes (see appendix for type and size) located near the property line where the source for CATV service is located. See typical floor plan for location of these conduits.

8. Provide sleeves through floors and ceilings as required for cable path ways.
9. Turn up U.F.D. (under floor duct) three inches from the wall and at least three inches above the finished floor.
10. Accessible pull boxes which can be used as a junction point for several one inch conduit runs and which provide an empty three inch conduit with mule tape having footage markings home run to the nearest Telecommunications Equipment room must be identified and detailed.
11. Provisions for dedicated voice and data jacks at mechanical EMCS stations and the direct dialer in the Telecommunications Equipment room for remote emergency monitoring must be made.
12. All voice and data jacks, wiring and cover plates will be furnished and installed by Fairfax County or its authorized vendors and contractors. Empty conduits with pull strings, pull boxes, junction boxes and fit-up of Telecommunications Equipment room with plywood, ground wire and buss bar, and electrical outlets as described in these guidelines, shall be included in the design and provided to the contractor.
13. All building wiring, pathways and spaces, grounding and bonding shall meet or exceed the ANSI/EIA/TIA Telecommunications Infrastructure Standards as well as the NEC Electrical code (NFPA 70) as referenced in Section 1- Standards and References of these guidelines.

3.3 Telecommunications Equipment Room Layout



3.4 Ground Buss Bar Details

